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FORESTRY

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VETERINARY MEDICINE

SEPTEMBER CONTENTS 1947

Veterinary Progress, Policies and Comments

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No. 9

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The body seems often to have more discernment than the mind, and man frequently thinks more rightly with his stomach than with his brain.—HEINE.

Reeves, Hammon and Furman, research workers in the George Williams Hooper Foundation, San Francisco, isolated Western equine encephalomyelitis virus in mites found in the nest of a yellow-headed blackbird and also from mites collected in the nest of an English sparrow. Both collections were made in Kern County, California.

In an emergency operation a person is no longer put on the operating table until after fluid has been given him if he is dry, nourishment if he is starved, blood if he is anemic, germ-fighting medicines called antibiotics, such as penicillin, if he is infected. All of these can be injected into veins if the stomach does not tolerate food. Before the surgeon will operate careful survey must show that the patient is in the best possible condition considering the emergency.—R. H. KENNEDY in *Hygeia*.

The newest adventure in chemotherapy is the treatment of leucemia with urethane or ethyl carbonate. In trials on mice and men this chemical has given as good results as X-rays in the treatment of this fatal disease of the blood forming organs. The extremely high white blood cell count drops to normal and the enlarged lymph glands and spleen are reduced. Recidivation occurred in mice but sufficient time has not yet elapsed to determine whether the improvement in human patients will be enduring.

Jaundice is observed in only about 50% of the cases of leptospirosis in dogs.

Tests in several states have shown that cows produce from 5% to 15% more milk when protected from fly annoyance than when no fly control measures are used. The higher percentage was attained rather uniformly when both building and cows were sprayed with DDT and good farm sanitary practices were employed, *i.e.*, fly breeding places eliminated so far as practicable.

The Milwaukee Dairy Council sent a couple of white rats to school. They were admitted to the 8th grade and fed by the pupils. One was fed a good breafast menu with milk; the other sweet rolls and coffee. When the latter lost his zest and became irritable and scrawny to a degree the children were sorry for him, he too was given cereals, milk and fruit. The celerity with which he snapped back to health is said to have convinced the students of the necessity for milk and an otherwise good breakfast to "start the day right."

Veterinary literature contains many references to "salt poisoning" in animals. Such reports are in agreement in one respect. They do not explain how a substance can be poisonous that is essential to every fluid and every cell in the animal body; indeed in every living organism from the highest to the lowest and in the sea wherein living creatures evolved. The senseless term "protein poisoning" originated, waxed, flourished, waned and disappeared almost within a decade, but salt poisoning appears to possess attributes of immortality.

Food Poisoning Due to Contaminated Beef

An outbreak of food poisoning affecting the major portion of a regiment of the Brazilian Army was investigated by *Instituto de Biologia do Exercito* and determined to be due to the consumption of beef contaminated with *Salmonella enteritidis* (Breslau) by flies and a human carrier. There were no deaths.

Dr. Parran Criticizes Antivivisection

Dr. Thomas Parran, Surgeon General, U. S. Public Health Service, criticized antivivisectionists when delivering the George Martin Kober memorial lecture at Georgetown University. Dr. Parran advocated legislation not only to authorize but to encourage the use of

Legislation to encourage the use of animals in research is advocated by the surgeon general of the U. S. Public Health Service

animals in medical research. He said "The best defense is a sharp offense" when pointing out that "neither scientists nor others do anything about it until some vicious bill is introduced in the Congress or a state legislature, and then the big names in medicine and research rush to the rescue." Dr. Parran said the country must have 270,000 physicians by 1960 if the nation is to reach the level of twelve states with highest rate of medical personnel to population.—*J. Am. Med. Assn.*

Packer-Pay Meat Inspection Wins

The Act to charge to meat packers the cost of federal meat inspection, voted by the House of Representatives and rejected by the U. S. Senate was accepted in conference and signed by the President.

As stated last month[1] the shift of the cost of inspection from the government to the packers having the inspection was opposed by the packers and by Secretary of Agriculture Anderson.

The effect of the new law on the number of packers seeking inspection for their plants is not immediately foreseeable. To date none has abandoned inspection nor has the number of applications for inspection lessened. The Meat Inspection Division of the B.A.I. has assured the public that there will be no deterioration in the quality of inspection.

Some packers expect that charging the meat packing industry for the cost of inspection may encourage various states to adopt the same policy for the inspection of plants engaged wholly in intrastate business. It is estimated the cost of inspection in a large plant amounts to only one cent per 20 pounds, live weight.

[1] Packer pay meat inspection. *Vet. Med.*, 42:8, pp. 281-282. 1947.

For Bigger and Better Wars

Systematic veterinary education in Europe derived from military necessity. In the rapid progress of civilization (?) during the 18th century armies attained a magnitude at which they could not subsist upon occupied territories nor could they be supplied from the homeland unless animal plagues could be brought under control. Thus veterinary colleges were established by the principal countries of continental Europe to conserve the food supply of their armies. The public health service of the German Empire, the most advanced of its time and the model from which public health measures in the Western World have been shaped, had its origin in an alarming report by a Prussian general in 1828, who viewed with painful alarm the decline of the population of the Rhineland in fitness for military service.

The "Days of the Old Horse Doctor"

There is little brilliance and plenty of ignorance in the hackneyed phrase "the old horse doctor" or the "days of the horse doctor," when used, as it usually is, to draw a contrast between the alleged erudition of the modern D.V.M. and the supposed incompetence of the former doctor of domestic animals. Besides being a confession of low ancestry, it is about the surest proof that history in veterinary education is as unknown to the user as the geography of the universe. Pity, it's that way, because ignorance wherever met is never heavenly. For one thing, the old horse doctors wore silk hats and long coats and carried the chin high. Out in the country, they drove poleteams and went to church. But the ignorance as an innuendo lies in the fact that their country up to the turn of the century and about two decades beyond provided no other personnel to drench the horses and rub on the liniment. So, "the old horse doctor" stuff is a slam at the dimension of Uncle Samuel's foresight also. Any way approached, the use of the term in our literature is not a bit smart.

Irradiated Antirabies Vaccine

Highly potent rabies vaccines were prepared by use of the Levinson-Oppenheimer ultraviolet technic and apparatus in the irradiation of rabies brain suspension.

Irradiated vaccines were consistently more potent than comparable phenolized vaccines.

Whole-brain emulsions as heavy as 20% were inactivated by this method of irradiation.

The potency of the irradiated vaccines was satisfactorily preserved in storage at 4° C.

The important factor in this technic of irradiation apparently was the use of the thin-film chamber as a means of exposing materials.—KARL HABEL in *Pub. Hlth. Repts.*

Barring Imported Rabies

In reporting a case of rabies that developed in the quarantine kennels on May 22, 1947, the British Ministry of Agriculture and Fisheries adds:

"This is the third case, since November, 1946, of rabies in an imported dog while in isolation in quarantine kennels. The incalculable harm to other animals and the risk to humans for which any one of these dogs might have been responsible, had it been at liberty at the time it developed the disease, needs no emphasis. Although the three dogs represent a very small percentage of the imported dogs which are quarantined in the course of a year, their deaths from rabies serve to underline the imperative need for the stringent restrictions which are imposed on every dog brought to this country from outside the British Isles."—*Vet. Rec.*

Nervous Disorders in Dogs

Dogs develop a wide variety of nervous ailments. Some of them are of frequent occurrence and are an important clinical entity.

The etiology of the nervous diseases of dogs varies. Neurotropic viruses are the most frequent cause of lesions produced by infectious agents. Chemical and biologic toxins, circulatory disturbances, congenital defects and tumors account for most of the other lesions seen. Certain diets produce nervous functional disorders, but sometimes dogs also develop true epilepsy.

Fits, convulsions and paralysis are the most frequent nervous symptoms observed. But dogs affected with encephalitis also commonly develop various mental disturbances and uncontrolled movements other than convulsions may be observed.

The character of the lesions observed varies. Those caused by infectious agents usually are characterized by infiltration of lymphocytes into the perivascular and intracellular spaces. Edema, too, is not infrequent. Toxic substances and circulatory disturbances commonly cause focal or dissemoniated areas of necrosis followed by gliosis. The necrosis may cause softening of the brain tissue. Hydrocephalus is not infrequent. Tumors are not a frequent cause of nervous disease in dogs. But nearly all types of tumors observed in the nervous system of man have also been observed in dogs. Meningitis is frequently associated with encephalitis caused by infectious agents.——*Abst. of an address by* CARL F. SCHLOTTHAUER *at 16th Annual Conference for Veterinarians, O.S.U., June 11-13, 1947.*

Estrus Cycle in the Rabbit

The rabbit and the ferret require the stimulus of coition for ovulation. In the rabbit the ovum survives only four hours after entering the oviduct, and unless spermatozoa are there to meet it fertilization does not occur. Spermatozoa live and are capable of fertilizing ova for 30 hours.

Catarrhal Fever of Cats

Catarrhal fever is the disease most likely to be confused with infectious gastroenteritis of cats. It is that which is, perhaps, above all others most often referred to as feline distemper, and in a mild case, as feline influenza.

This disease affects cats of all ages and may be acute or chronic; it affects the respiratory tract as well as the alimentary.

It is characterized in the acute cases by a severe conjunctivitis, lachrymation, sneezing, an abundant greenish-yellow discharge from the nostrils, salivation, stomatitis, sickness and diarrhea, pharyngitis, fetid breath, offensive odor, bronchitis and sometimes pneumonia. Death may occur within 48 hours, but cases frequently recover. In less acute cases nasal discharge may remain and continue throughout life.

A milder form exists which commences with frequent sneezing and nasal discharge, at first serous but quickly becoming mucopurulent, salivation, lacrymation, pharyngitis, depression and disinclination to move. The appetite is regained when the throat condition improves and the nasal discharge clears up. The mortality is about 20%.

It has been suggested that this may be another form of infectious feline enteritis, but it is interesting to note that Dalling found catarrhal symptoms in cats where no virus could be demonstrated and found that cats immunized against infectious gastroenteritis were not immune to catarrhal fever.—F. C. HOLLIDAY-POTT, in *Vet. Rec.*, 58:46. 1946.

Korea's First School of Veterinary Medicine

Korea's first School of Veterinary Medicine has been established and will begin operation in September, according to an announcement by Choi Kyu Dong, president of the Board of Regents of Seoul National University.

All funds, facilities and students of the Department of Veterinary Medicine at Suwon Agricultural college will be transferred to the new school. Dr. Y. S. Lee, Department of Public Health and Welfare director, has arranged for allocation of one million yen to aid in financing the school during its first year.

Under the new plan, veterinary science in Korea strides toward modernization, guided by the former chief veterinarian of the U. S. Air Forces, Dr. Benjamin D. Blood of Wabash, Ind., who is now chief advisor for veterinary affairs in Korea.

Operating under a four-year curriculum, the new college is expected eventually to produce

Col. Benjamin Blood, chief advisor of veterinary affairs in Korea, was formerly chief veterinarian of the U. S. Air Forces

50 graduates a year in contrast to the five to eight now graduated annually. The latter small number is considered inadequate to provide veterinary support to Korea's economy which is predominately agricultural, with animals a vital source of farm power and transportation.

The school will equip and operate a complete hospital for the care and treatment of large and small animals for the first time in the history of Korea. In addition to giving clinical training to students in their final two years, the institution will provide a service to Korean animal-owners that was never before available: clinical treatment and hospitalization at a very low cost on a non-profit basis.

"Seoul, the capital city of Korea, will provide a large number of sick and injured animals for clinical instruction of students," pointed out Doctor Blood, "whereas at Suwon students have seen not more than one or two clinical cases per week; clinical experience in the new college will be a most important part of the training of veterinary students."

Integrated into Seoul National University, the new institution will enable its students to round out their training in all phases of veterinary science, including internal medicine, surgery, pathology, pharmacology, medical bacteriology and similar studies. "As a result," explained Doctor Blood, "veterinary medicine will achieve the status accorded it in other countries: a highly scientific profession."

This contrasts with its previous standing at the Suwon school where it was so intermingled with animal husbandry, by the Japanese who set up the original curriculum, that it was classified as an agricultural vocation.

Korean and American veterinarians in Seoul endorse the new move unanimously, hailing it as an important step in the social and economic betterment of the country.

Fifteen New Medical Journals

A venture in medical publishing of note is the establishment of *Excerpta Medica* at the University of Amsterdam, Holland. It is to be published in 15 sections and amounts to 15 medical journals, since each section is distinct from all the others and has its own editors, authors and subscribers. The aim of the 400 editors of *Excerpta Medica* and its 3,000 abstractors is to present a complete survey of all medical literature in the form of abstracts and summaries. Publication is in the English language.

The annual subscription rates and the approximate number of pages per year are given as:

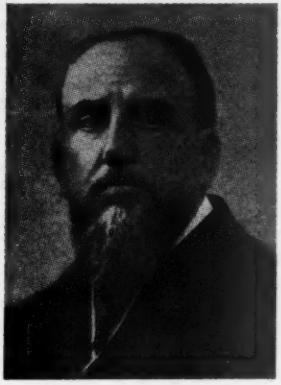
Section I	Anatomy, Anthropology, Embryology and Histology (900 pages), $22.50.
Section II	Physiology, Biochemistry and Pharmacology (1800 pages), $45.00.
Section III	Endocrinology (600 pages), $15.00.
Section IV	Public Health and Social and Industrial Medicine (900 pages), $22.50.
Section V	General Pathology, Pathological Anatomy and Bacteriology (1500 pages), $37.50.
Section VI	Internal Medicine (1500 pages), $37.50.
Section VII	Pediatrics (600 pages), $15.00.
Section VIII	Neurology and Psychiatry (900 pages), $22.50.
Section IX	Surgery (1000 pages), $25.00.
Section X	Obstetrics and Gynecology (600 pages), $15.00.
Section XI	Oto-, Rhino-, Laryngology (600 pages), $15.00.
Section XII	Ophthalmology (600 pages), $5.00.
Section XIII	Dermatology and Venereology (1000 pages), $25.00.
Section XIV	Radiology (600 pages), $15.00.
Section XV	Tuberculosis (600 pages), $15.00.

The editor-in-chief is M. W. Waerdeman, M.D., Professor of Anatomy and Embryology in the University of Amsterdam. The American agent of the publisher is Williams & Wilkins, Baltimore.

Death of Professor Vallee

In the death of Prof. Henri Vallée, at Dijon, France, March 12, 1947, the veterinary profession lost one of its most brilliant figures in the field of research. His achievements had traveled far beyond the borders of his native country to enrich veterinary science.

Professor Vallée first came to the attention of the veterinary world outside France as assistant of the famous Nocard, to whose position as Professor of the Pathology of Contagious Diseases at the veterinary school of



Alfort he succeeded in 1904. He became director of the school in 1911 and in 1920 also director of the Central Laboratory of Veterinary Research of the Ministry of Agriculture which was located adjacent to the school. In 1929 he was appointed *"Chef Supereur des Services Vétérinaires* at the Ministry of Agriculture.

Vallée was *Commandeur de la Legion d'Honneur, Membre de l'Académie de Medécine, Membre de cl'Aadémie Vétérinaire, Chef de Service a l'Institut Pasteur* and a member of most other French scientific societies, including the *Académie de sciences, Académie d'agriculture, Société de biologie, Société de pathologie comparée* and many others. He was an honorary member of the *Institut Vétérinaire de Krakow,* the national medical societies of Belgium and Roumania and of the Royal College of Veterinary Surgeons of Britain and of the A.V.M.A. He was a permanent delegate of the French government to the League of Nations.

The research conducted at the Central Laboratory during Vallée's regime, which is best known in America was that on foot-and-mouth disease, infectious equine anemia and Johne's disease. In addition Vallée conducted notable research on anthrax, blackleg, gas gangrene, rabies, tetanus and tuberculosis. Carré and Rinjard collaborated with him in much of this work.

Unfortunately Vallée was compelled to retire from the position of director of the Central Laboratory in 1931, at the age of 57, because of ill-health. The following 16 years of his life were spent in semi-invalidisms.

HOLM PROMOTED IN IDAHO

Dr. Glenn C. Holm, for the past nine years veterinarian at the University of Idaho Experimeniation Station, left his post July 25 to become vice-director of the Station. Dr. Holm takes over duties of the office left vacant by the resignation of Dr. C. W. Hungerford who has served for the past 20 years. As vice-director of the experiment station, he is in charge of all research in the College of Agriculture at the University and at its five branch stations over the state. His duties also include cooperative research work with state and federal agencies. Doctor Hungerford will devote his entire time to serving as dean of the University's Graduate School and as head of the Department of Plant Pathology. Doctor Holm became head of the new Department of Veterinary Science of the University of Idaho July 1, 1947

Veterinary Corps Officers Separated from the Service Since VE-Day

(Supplemental to lists previously published)

Alabama

Capt. Otis H. Burnside Capt. Thos. T. Wiggins

California

Capt. James E. Anderson

Indiana

Capt. Ivory D. Richardson

Iowa

Capt. Roy E. Kyner, Jr. Maj. H. E. McCutchan

Kansas

Capt. Don R. Bowers Lieut. John A. Bradbury

Kentucky

Lieut. William O. Caplinger

Missouri

Capt. Nelson D. Crandall

New York

Capt. Robert J. Byrne Capt. Boynton A. Grover

Capt. Joseph C. O'Dea

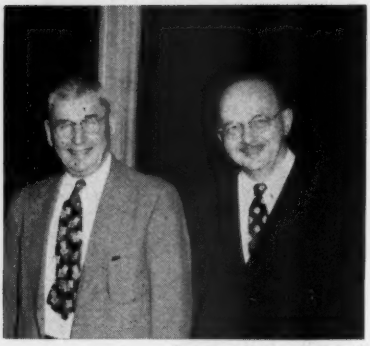
Ohio

Capt. Roger W. Grundish

Pennsylvania

Capt. Paul Brown, Jr.
Capt. James M. Shellenberger
Texas
Capt. Eugene D. Dillon Capt. Jessie S. King
Maj. Walter A. Lawrence
Address Unknown
Capt. Howard H. Hall Lt. Col. Thomas A. Ward

Colonel White Retires



Courtesy National Provisioner

Col. Jesse H. White, CVC '05, retired recently from his position as executive assistant to the commanding officer of the Army Quartermaster Food and Container Institute. A luncheon was given him at the Palmer House, Chicago, sponsored by the American Meat Institute and the National Meat Canners Association.

Colonel White has long held a reserve commission in the Quartermaster Corps of the Army and in both world wars and at various periods between them was on active duty planning army rations and methods of preparation and packaging. During the recent war he developed 60 canned meat items, many of which are now standard in the peacetime Army. As evidence of the appreciation of the meat industry of the 42 years expert service Colonel White has given it, he was presented with a set of traveling bags. Shown with Colonel White is Wesley Hardenbergh (right) president of the American Meat Institute.

A series of experiments supported by Wilson and Company, Chicago meat packers, and conducted at the University of Wisconsin have demonstrated that hoof powder is of value as a protein supplement in animal feeds. Used at the rate of 30%, hoof powder as the only protein in the ration resulted in good growth in animals. Equal growth was obtained on an 18% hoof powder protein supplement when it was fortified with 0.1% tryptophane, 0.6% lysine, 0.3% methionine and 0.4% histidine, four essential amino acids in which hoof powder is deficient.

Chloroquine (SN 7618) is superior to atabrine (quinacrine) in the treatment of vivax malaria of either Pacific or Mediterranean origin, according to a group of medical officers who studied the malaria problem at the Moore General Hospital, Swannoa, S. C.

Modern surgery is only about 60 years old. This period represents almost all the advances in surgical knowledge. With each decade it is thought that all surgical discoveries have been made but new ideas always come forth opening up new fields for doing good. . . . During almost every year it is found that some condition is amenable to an operation previously unknown.—R. H. KENNEDY, M.D., in *Hygeia.*

Differentiating the Semen of Breeds

As a safeguard against inseminating dairy cows with semen from a bull of the wrong breed, Pennsylvania artificial inseminating cooperatives color the semen so that the breed of the bull is instantly recognizable. Coal tar dyes are used—green for Holstein-Friesian, red for Jersey, yellow for Guernsey, purple for Ayrshire and, naturally, brown for Brown Swiss.

The technic for dying semen and dyes that are innocuous to the spermatozoa was developed by Prof. John O. Almquist of the Pennsylvania State College.

A Reinforced Brucellosis Vaccine

In a current issue of *Bulletin de l'Académie Vétérinaire de France,* Lisbonne, Ramon and Quatrefages of the Pasteur Institute report an improved method of live culture vaccination against bovine brucellosis which was crowned with unusual success in a small but well controlled scientific research. The product employed was a combination of (1) an attenuated strain of *Brucella abortus* comparable to the American strain 19 which they named B 112 and (2) a glucido-lipidic antigen, rich in antibodies, derived from *Brucella melitensis.* The culture used contained one billion germs per 1cc. An initial dose of the mixture is followed every eight to ten months with a fortifying dose of the antigen. On 77 Brucella-free heifers vaccinated and intentionally exposed to badly infected herds and repeatedly checked for clinical and serological evidence of brucellosis from 1941 to 1946, there was but one abortion compared with an incidence of abortion that sometimes ran as high as 80% among the cows to which they were exposed. This research was conducted in cows to confirm analogous results previously obtained in experimentally infected laboratory animals.

Avian Pneumoencephalitis Invades 41 States

Avian pneumoencephalitis has been diagnosed in 41 states and the District of Columbia. Broiler raisers along the Atlantic coast from Delaware to Virginia have suffered the heaviest losses from the disease which have averaged 15 to 20% of young birds in infected flocks. A marked decrease in egg production has followed infection in laying flocks.

Vaccination, as a means of control, is being used extensively in the broiler raising section and in the District of Columbia. Definite conclusions as to its value have not been reached.

High Cost of Swine Parasites

A summary of the situation, based on reports from several southeastern states meat packers having Federal inspection shows that kidneys and livers were the organs of swine most severely parasitized. On the average about 94% of kidneys and 70% of livers failed to pass Federal inspection. The corresponding figures for other organs ranged from about 30% for casings to 10% for tongues where such data were reported. The loss of valuable loin meat averages about 2% because of necessary trimming to remove affected portions. Some packers reported that the number of entire carcasses condemned for food because of gross parasitism slightly exceeded 1%.

Stephanurus dentatus

Enlarged illustration of female kidney worm of swine; a, male and b, female natural size

Alfalfa

Alfalfa is now the principal forage crop of the United States. It comprises 15% of all harvested feed crops and ranks next to corn in economic importance. The U. S. production for 1946 was approximately 33 million tons grown on 15 million acres as compared with a total of 100 million tons for all kinds of hay from 70 million acres. In addition, it is extensively used as pasture, particularly for hogs in the Corn Belt. Its popularity is easily understood when we reflect that it stands at the head of the list of harvested crops in yields of pounds of protein and total digestible nutrients per acre. Based on average yields for the whole country, an acre in alfalfa yields twice as much protein as an acre in corn, clover or soybeans, 3 times as much as corn silage, and 5 times as much as timothy or other non-legumes. — *Ralston Purina News Bulletin.*

Hybrid Alfalfas Promising

The astounding success attending the hybridizing of corn has energized attempts to improve other farm crops in the same way. Experiments at the Ohio station to produce hybrid alfalfas are far enough along to have shown encouraging results under experimental conditions. It is expected that it will be several years before hybrid alfalfas will be available commercially.

Annual Loss from Brucellosis Staggering

The annual food loss in milk, butter, beef, veal and pork from brucellosis reaches a staggering total in calories of the kind most needed by an underfed world.

Brucellosis is one of the most prevalent diseases today and a source of potential danger to the national health. Goats, cows and hogs harbor the infection and man contracts it by drinking raw milk or handling infectious material.

The total number of cases in persons, reported in the United States, has averaged about 4,000 yearly for the past several years. Only the relatively severe acute illnesses are diagnosed and reported. Chronic infections outnumber the acute illness by a ratio of at least 10 to one, but these chronic infections are rarely diagnosed. If 4,000 cases are reported yearly it is probable that from 40,000 to 100,000 infections occur.

The average infected cow in Michigan was found to produce 2,065 pounds less milk per lactation period than the noninfected cow. Estimating that 10% of 1,080,000 cows in the state of Michigan were infected, the 108,000 infected cows resulted in a total milk loss of 222,904,000 pounds of market milk per year—enough to supply 557,000 persons.

Development of still better methods in diagnosis, treatment and prevention, in animals and man, depends upon an increasing "brucellosis-mindedness" and continued investigation. The disease continues to be a major public health problem. Pasteurization of all dairy products must remain the greatest bulwark against human infection until methods of control can be perfected.—*J. Am. Med. Assn.*

It is dangerous for the sick to eat the wrong kind of food; but the man who is well is really likely to do himself harm only if he distrusts his inclinations in the selection of food, and if he tries to be cleverer than nature by the choice of a particularly unusual diet.—PUTTER.

Two New Drugs

Isuprel (aludrine) an analogue of adrenalin, but 100 times less toxic, can be given hypodermically, orally and by inhalation. The indications are the same as for epinephrine or adrenalin.

It is said to afford asthma sufferers more relief than the older remedies. As yet it is available for experimental purposes only.

Priscol is a new drug related to histamine that dilates the arterioles, lessening the burden on a laboring heart.

Dosage of Penicillin

Satisfactory clinical response should follow penicillin therapy when body tissues contain enough penicillin to inhibit growth of the infecting organisms. The blood plasma has been shown to contain penicillin in about the same concentration as most other body tissue and for this reason blood plasma penicillin concentration has been determined at various time intervals following administration of penicillin to horses, cattle and dogs. This was accomplished by a biological method of assay. This means that the amount of penicillin in the blood plasma was not measured directly but was estimated by comparing the bacteriostatic activity of the plasma with that of a standard solution of penicillin. By obtaining blood samples at 15 to 30-minute intervals following injection of penicillin it was possible to show that there is a rapid rise in blood plasma penicillin concentration and gradual decline over a period of two to 12 hours depending on the size of dose and type of penicillin preparation injected. In general saline preparations of penicillin should be injected about every three hours in animals, while special beeswax and oil preparations containing penicillin should be injected about every eight to 12 hours, depending on the size of each dose and other factors.

"In the manner described above certain doses can be suggested as logical starting points for treatment of some of the diseases of animals, which include pneumonia, abscesses, leptospirosis in dogs, distemper complications in dogs, strangles in horses, and most staphylococcic and streptococcic infections.—R. L. RUDY *at the O.S.U. 16th Annual Conference for Veterinarians, June 11-13, 1947.*

Progress in the Study of Vitamins

Few not engaged in the manufacture or assay of vitamins realize the progress that has been made in recent years in adding to the knowledge of these essential food factors. Only a few years ago, weeks or even months of laborious animal feeding experiments were required before even the approximate amount of a vitamin in a given food product could be determined. Now, the concentration of the better known vitamins can be determined far more accurately by chemical, physical or microbiological procedures within a few days and in some cases within a few hours.

The importance of vitamin assaying is indicated by the fact that there is a national "Association of Vitamin Chemists" which holds annual meetings at which their problems are discussed. The Association has published a 200 page book, "Methods of Vitamin Assay" to standardize this work. The headquarters office of the Association is at the University of Illinois, School of Pharmacy, Chicago.

Author of Opsonic Theory Dies

Sir Almroth Wright, 86, died in London, April 30th. Although Doctor Wright was one of the most brilliant of medical researchers, he is remembered by American veterinarians for having popularized the use of bacterins.

Pasteur was, of course, the first to demonstrate that vaccines could immunize animals against bacterial disease. A dozen years later D. E. Salmon and Theobald Smith of the U. S. Bureau of Animal Industry discovered that in certain diseases a parallel effect could be produced by the injection of killed instead of attenuated bacteria. This was confirmed in the years that followed by Roux (Pierre Paul Emile) of Paris. Soon after the turn of the century Doctor Wright began the investigation of vaccines made by heat-killed bacteria for the treatment of disease. His work was fully reported in American veterinary literature. In the years 1908, 1909 and 1910 the use of bacterins as such vaccines were called in America experienced an extraordinary growth among American veterinarians. By the latter date bacterins had achieved a popularity among American veterinary practitioners never attained by any other prophylactic or therapeutic agent except, possibly, the sulfonamide as a group during recent years. In the decade following World War I bacterin therapy lost much, probably a major portion of its popularity, but a solid foundation of usefulness was established which has since endured.

Foot-and-Mouth Disease Officials Adhere to No-Vaccine Policy

Confirming a previous decision and announcement that vaccines have no place in the campaign to eradicate foot-and-mouth disease from Mexico, the officials in charge of the eradication program have reiterated that stand and cited supporting reasons. The statement of explanation was prompted by proposals from various sources that vaccination would hasten the progress of eradication work, whereas actually it would be a hindrance.

Their reasons that vaccination would impede the program were, in substance, as follows: (1) In countries where vaccination against foot-and-mouth disease has been tried, it has neither led to the complete suppression of the disease nor been fully dependable as a preventive. (2) Some vaccinated animals are never fully resistant to the infection. (3) The duration of immunity is only from five to eight months and, to maintain protection, revaccination is necessary. (4) In many areas of Mexico, transportation and other conditions are such as to make impossible the maintenance of the vaccine's potency before it can be used. (5) Difficulty in the procurement of wholly susceptible animals needed for producing and testing the product. (6) Difficulty of keeping the highly infective virus from escaping from laboratories and spreading the disease among livestock.

The officials concluded their views by agreeing that the commission which has charge of the campaign "should firmly adhere to its established policy of eradication, including absolute prohibition of vaccination." The statement was made jointly by Lic. Oscar Flores, director of the commission, M. S. Shahan, co-director and several of their chief technical advisors.

The no-vaccination policy may be the correct one in the present outbreak of foot-and-mouth disease in Mexico but if so there must be better reasons for not employing it than the International Commission has given. Among the foregoing reasons No. 1 is wholly specious. The present vaccine against foot-and-mouth disease has had but two trials of significant magnitude. In the outbreak in Germany in 1938 the vaccine had just been developed, no considerable stock was on hand nor had facilities for large production or distribution been evolved. Furthermore the disease of an unusually virulent type and had spread beyond hope of being circumscribed before vaccine in quantity could be prepared. For these reasons very little vaccine was used. A second test of this vaccine was made by the Army in the vicinity of Rome during the war. The object was to suppress the disease in that district and conserve the milk supply of the city. This was fully accomplished. No attempt was or could be made to eradicate the disease from Italy.

No. 2. The record doesn't support this statement, but such will undoubtedly be found to be the case, when it is used in large quantities. This reason, if valid, would eliminate the use of all vaccines—hog cholera, encephalomyelitis, anthrax, rabies, brucellosis, small pox, etc. It is a strange argument to come from a scientific body, whose members know there are no 100% cures or preventives in medicine.

No. 3. With the spread of the infection stopped by rings of immune animals, great progress should be made in the eradication of centers of infection by the slaughter and burial of the affected animals.

No. 4. It is a lucky thing the Medical Department of the Army didn't know, during the war, that there were climates and terrains where biological agents couldn't be carried with the transportation available.

No. 5. This difficulty is not unique. It has been surmounted in the case of other biological products.

No. 6. Vallée and Paré experimented with foot-and-mouth disease virus for a number of years in a laboratory separated from a dairy only by a brick wall eight feet high. There was no escape of the virus and the cows in the adjacent dairy suffered no outbreak of the disease during those years. This is but a single instance but it is significant that the French veterinarians who were among the dozen top authorities in the world on the disease were willing to undertake research on it in such surroundings.

Briefly foot-and-mouth disease is a formidable adversary and those who combat it need to use every effective means at their command. In this country several outbreaks have been eradicated promptly and economically by wholesale slaughter. Future outbreaks can, no doubt, be eradicated in the same manner. In Britain many hundreds of outbreaks have been eradicated in a similar manner. But this outbreak is in Mexico. The authorities at first asked the Congress for nine million dollars, which is more than the eradication of any but one of our outbreaks of this disease cost. In a few months they asked for $65,000,000 additional. Methods should no more be frozen than estimates.

No one knows, and this includes members of the commission, whether vaccination would help bring this outbreak under control and further its eradication. It might do so and lower the cost by millions of dollars. It would

if it didn't work it could do no harm, except for the expenditure which would be insignificant compared with the whole cost of eradication. The achievements of the "established policy", to date in this outbreak, do not establish its infallibility. After all the "established policy" in essentials is 75 years old and a lot

SUSCEPTIBILITY OF SPECIES

VIRUS	HORSE	BOVINE	SWINE	GUINEA PIG
VESICULAR STOMATITIS	+	+	+	+
VESICULAR EXANTHEMA	±	−	+	−
FOOT-AND-MOUTH DISEASE	−	+	+	+

Clinically the three vesicular disease named above are indistinguishable. Different diagnosis is aided by the differing reactions of the horse, ox, pig and guinea pig to inoculation

of water has run under bridges in 75 years. There has been much fruitful research on foot-and-mouth disease in that period too. The scientific approach is a questioning, not a dogmatic, one.

Officials engaged in the work of foot-and-mouth disease eradication express gratification at the progress made during the past month and complete confidence in ultimate success of the project.

At a conference of the joint commission held in Mexico City July 25th Chief Simms of the B.A.I. announced that the present number of U. S. veterinarians assigned to the eradication force would be doubled and the number of U. S. technicians would be tripled. Under Secretary of Agriculture N. E. Dodd assured the Mexican authorities that adequate U. S. dollars are now on hand and will be supplied to meet the needs of the campaign.

Recent additions to the equipment supplied for the war against foot-and-mouth disease in Mexico includes four U. S. Army mobile machine shops valued at more than $60,000. These traveling machine shops will effect a saving of 30% in the time required for maintenance and repair of the jeeps, passenger automobiles, trucks, bulldozers and power shovels used by the field force. Heretofore this equipment had to be sent to the Commission's central machine shop in Mexico City for repair, thus entailing considerable loss of time.

Diagnosis of Vesicular Diseases

Veterinarians from 12 States recently completed a two-week training course on methods of diagnosis of vesicular diseases, that may be confused with foot-and-mouth disease, at the Bureau of Animal Industry's Animal Disease Station at Beltsville, Md. The course included lectures and laboratory tests concern-

RESULTS OF INOCULATION

VIRUS	ROUTE OF INOCULATION		
	LOCAL	INTRAMUSCULAR	INTRAVENOUS
VESICULAR STOMATITIS	+	−	±
VESICULAR EXANTHEMA	+	±	±
FOOT-AND-MOUTH DISEASE	+	+	+

Inoculation procedures and their interpretation are exacting and only persons with technical knowledge and experience should assume the responsibility of making final diagnoses. The occurrence of any vesicular disease ,at this time, should be reported immediately to the state livestock sanitary authorities or to the B.A.I. Inspector in Charge for the area

ing methods of differentiating between all vesicular disease so that the Bureau's veterinarians may be better able to make a diagnosis in case of any suspected outbreak.

The Department's two motion pictures on vesicular diseases were shown and lectures given describing methods of eradication for foot-and-mouth disease as conducted in this country in former years when the malady made its appearance. The discussion included also the most efficient methods of disinfection of premises after infected or exposed animals have been slaughtered and buried.

Those who gave lectures during the conference were Dr. B. T. Simms, Chief of the Bureau of Animal Industry, Dr. H. W. Schoening, Chief of the Pathological Division, Dr. S. O. Fladness, Assistant Chief of the Bureau, Dr. A. B. Crawford, Superintendent of the Animal Disease Station, Dr. F. W. Tilley, R. R. Henley, Dr. L. T. Giltner, Dr. L. O. Mott, of the Pathological Division, Dr. R. Snyder, of the Interstate Inspection Division, and Dr. M. R. Clarkson, Chief of the Inspection and Quarantine Division.

Use of Distemperoid Virus in the Treatment of Canine Distemper*

THE therapeutic action of the modified canine distemper virus was as much of a surprise to me as it could have been to anyone else.

There is nothing mysterious about viruses. They are just like bacteria or protozoa that have become highly adapted to a parasitic existence and have, of course, their enzymes and special systems.

The virus is an intracellular parasite. It must learn to grow in an animal and in certain cells of that animal. It usually grows well in embryonic tissue and in one or more types of specialized cells. When it learns to grow well in one species, it is apt to grow also in related species. The cell specificity of a virus is often greater than the host specificity. Thus, a virus may grow more or less successfully in several related species of host, but grow only or chiefly in the same type of cells in all of them.

Canine distemper virus, for example, will grow in the dog, wolf, fox, raccoon, bear, ferret and skunk. It is probably to be expected that it would grow in the closely related dog and wolf and perhaps, fox, but that it should grow in such distant relatives of these animals as the raccoon and skunk is evidence of a high degree of adaptation. In all these animals it is adapted to grow in the same type of cells. The epithelial cells of the respiratory, digestive and urinary system. When it is found growing in any other cells, it is a result of spilling over into them late in the attack of the disease, when the virus has increased enormously and there are no more epithelial cells to invade.

Further study of the distemper virus has necessitated a revision of some of the views that were formerly held. Distemper virus does not, as a rule, produce a light infection. The severe symptoms of distemper and death when it occurs, are not dependent upon the secondary invaders but are due to the virus, which is in there pitching from first to last whether the animal dies or recovers.

A special feature of natural virus infection is that it is always attached to or within cells. This, of course, is in contrast to bacterial infection which develops in the body fluids. When we inject the virus into an animal, we turn it loose in the blood or lymph and it is quickly distributed through the body.

When distemper virus, that has become adapted to one species of host and grows well in it, is inoculated into a host of another species, at first it does not grow well in the new host but after a large number of passages through the new host species, it becomes well adapted and highly virulent for it. At the same time, it loses some of its adaptation to the old species and becomes incapable of producing disease in it or produces only a mild disease.

Thus, distemperoid vaccine is produced by starting with a strain highly virulent for dogs and only a little less virulent for foxes and passing it through ferrets. After some sixty passages through ferrets, it is highly virulent for ferrets and skunks, produces a mild disease in bears and raccoons and a subclinical disease in the cynoids—dogs, wolves, coyotes, and is incapable of spreading naturally among these latter animals. It produces no observable reaction whatever in foxes, even when large doses are injected into young fox pups. Yet the vaccination produces a solid, long-lasting immunity in dogs and foxes.

Distemperoid vaccine cannot be used for mink. In these animals it causes disease. But dogs or foxes vaccinated with it are not able to infect mink. For the past seven years it has been used on from 20,000 to 40,000 fox pups each year on a large fur ranch, and there has been no instance of its spread from the fox pens to interspersed mink pens although no precautions were taken to prevent such an occurrence.

A peculiarity of distemperoid vaccine is a reversal of the usual relation between the dose and the reaction or symptoms produced by the modified virus. That is, the smaller the dose of vaccine, the greater the reaction of the animal or, the larger the dose of vaccine, the less marked the reaction. Thus, 2.5mg of vaccine produces a sharp curve that begins an abrupt rise in the temperature on the sixth day after vaccination and reaches about 104° F. in 24 to 36 hours, then falling immediately to slightly below normal in the following 24 hours. The temperature remains normal or below normal one or two days then rises a second time but not as high nor as rapidly as before. It changes little for about a week then falls gradually to normal.

If, however, a dose of vaccine six times as large—15mg—be given, the initial temperature rise and fall is more gradual and the maximum is lower than from the small dose.

*Notes from a discussion on the use of distemperoid as an immunizing and therapeutic agent in canine distemper, by Dr. R. G. Green, at the annual meeting of the Northern Illinois Veterinary Medical Association, Rockford, Oct. 24, 1945.

Further, there is no secondary rise following the large dose of distemperoid vaccine. It took some time to discover this peculiarity of distemperoid vaccine but now it has been definitely established as a result of a large number of controlled experiments. This peculiarity of distemperoid vaccine is probably not unique. It may be characteristic of other virus vaccines.

The explanation of this reversal of the usual results following vaccine is not definitely known. It is thought that the 2.5mg dose of vaccine may contain virus sufficient to invade only part of the susceptible cells in the animal and the virus spreads from these to the remaining susceptible cells in the natural manner of the extension of the disease. When the larger dose of vaccine is administered, all susceptible cells are invaded at the same time by the free circulating virus and the reaction is sooner over. Why it is less acute is as yet unexplained. There is no difference in the degree of immunity produced by the small, the medium size and the large dose of vaccine. The advantage of the large dose is in the milder reaction produced.

This blocking of the susceptible cells against a virulent virus by a previous invasion of a non-pathogenic virus or by one causing a milder type of disease has been demonstrated with several viruses other than that of canine distemper. Puntoni showed that if avirulent strain of rabies virus is injected into an animal, it will prevent infection by a virulent strain injected subsequently. It may be that this is what happens when a person is given the Pasteur treatment.

A large number of animals, dogs and foxes, have been injected with distemperoid virus at varying periods before and after experimental inoculation with canine distemper virus by the intranasal route. Ten of a group of 50 were vaccinated with distemperoid virus and, three days later, these and a group of 10 that had received no treatment (control) were inoculated with distemper virus. The ten vaccinated animals remained well, the unvaccinated group all died of distemper. A third group of 10 were vaccinated at the same time they were inoculated, that is to say, within 10 to 15 minutes after inoculation. Of these, five suffered mild attacks of distemper and five showed no symptoms of the disease. A fourth group of 10 was vaccinated three days after inoculation. In this group there were five severe cases of distemper but none died. The other five escaped the disease. A fifth group were vaccinated 12 days after inoculation when all were showing symptoms of distemper. All died.

This experiment was not designed to test the therapeutic value of distemperoid vaccine in canine distemper but to determine the blocking effect, when it could be got to the susceptible epithelial cells before the virulent virus reached them. The exposure was many times as severe as that which occurs naturally and the wide dissemination of the virulent strain of the virus thus occurred earlier and was far more complete initially than in the case of naturally acquired infection.

With this evidence that the distemperoid could block out invasion by the virulent virus after even massive infection, provided only that it got to the susceptible cells first, an experiment was undertaken in which doses of various sizes were administered to dogs at different stages of distemper.

A dose of 7.5mg was given after artificial inoculation to (1) a dog in the incubation stage, (2) a dog when the first definitely recognizable symptoms of distemper developed, (3) in a middle stage and (4) in a late stage of the disease. Some benefit from the treatment was apparent in the case of the first dog.

The experiment was repeated using a 15mg dose. The dog in the incubation stage of the disease was protected and developed no symptoms. The dog showing the early symptoms of distemper was possibly benefited since his attack was not severe. There was no effect on the course of the disease in the remaining dogs and both cases terminated fatally.

The experiment was again repeated using a 50mg dose of distemperoid virus. This dose prevented the development of symptoms in the dog in the incubation stage of the disease and reversed the progress of the disease in the animal in the early stage. He showed improvement in 24 hours and recovered completely in a few days. The course of the disease in the remaining dogs in the experiment was unaffected.

This experiment was repeated several times employing doses of the same or other sizes. The conclusion was reached that the minimum therapeutic dose of distemperoid vaccine should be 1mg per pound of body weight and it is better to give a 25 to 50% larger dose to provide a margin of safety. The vaccine appears to be entirely harmless in large doses since doses up to 500mg produce no reaction even when given to small dogs. However, it will be remembered that, as has already been stated, small doses, to 5mg or 10mg produce a distinct reaction in these same animals.

To sum up:

1. Distemperoid vaccine in adequate dosage produces an immediate and lasting immunity to canine distemper.

2. A sufficient dose—at least 1mg per pound body weight—administered in early stages of the disease will block off the virus and reverse the course of canine distemper.

Anthelmintic Efficacy of Hexachloroethane Suspension on Some of The Pathogenic Nematodes of Cattle

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IN the course of studies conducted during the past five years on the efficacy of hexachloroethane suspension as a fasciolicide in cattle[5] some observations have been made regarding the effect of this drug on stomach worms and hookworms. The question concerning the anthelmintic properties of this drug against the pathogenic nematodes of cattle has been raised frequently by stockmen. It is the purpose of this article, therefore, to report the information that has been accumulated by the writer on this subject.

Previous Reports on Nematocidal Value of Hexachloroethane

Hexachloroethane was first tested for nematocidal properties by Hall and Cram.[2] They administered it to dogs in crystalline form in capsules, and in solution in castor oil, oil of chenopodium, and carbon tetrachloride. They concluded, on the basis of their experiments, in which hookworms were not removed from dogs, that the chemical, because of its low solubility in water, had no value as an anthelmintic.

In Jugoslavia, Vukovic[7] and Jezic and Mlinac[3] reported that "igitol," a proprietory fasciolicide, consisting of hexachloroethane and starch pressed into boluses,[6] was effective against strongyles in sheep.

In South Africa, Mönnig[4] reported that hexachloroethane was not effective against the nodular worm (*Oesophagostomum columbianum*) in sheep.

Materials and Methods

The data reported in this paper were obtained from dilution egg counts and postmortem worm counts, wherein comparisons were made between the worm counts of comparable treated and untreated animals.

The dilution egg counts were made on 17 premedication and 14 postmedication, fecal samples from 17 yearling Hereford steers in the coastal prairie of southern Texas. The treatment consisted of four ounces of hexachloroethane suspension, and was repeated one week later. The worm counts were made on 20 calves, eight months of age, from southern Louisiana. Nine of the calves had been treated with 3.5 ounces of hexachloroethane suspension one week prior to slaughter; the remaining 11 were not treated and served as controls. At the time of slaughter, the abomasum and the first two to three feet of the duodenum were ligatured, separated from the remainder of the viscera, and preserved in formalin. The contents of the abomasum and duodenum were washed separately through screens of graduated mesh of a size to remove excess debris.

The number of stomach worms was determined by dilution counts. After diluting, the screenings from each portion of the digestive tract in a round battery jar to 2,000cc. While the material was in even suspension a 50cc sample (one-fortieth of the total volume) was drawn from the jar, by means of a 50cc volumetric pipette equipped with a 60cc rubber bulb. The narrow tip of the pipette was removed to allow free passage of the large particles of plant material in the feces. The worms were identified, and the number of each species computed for both the abomasum and duodenum of each animal.

The number of hookworms was determined by direct count since these parasites were easily seen and relatively few in number.

The egg counts were made from rectal samples of feces by a modified dilution technic. Thirty grams of feces diluted to 300cc with a 0.1 N sodium hydroxide solution were allowed to mascerate over night. A 30cc aliquot of the suspension containing three grams of fecal material was transferred to a large tube, precipitated by centrifugation, the supernatant fluid drawn off, and the precipitate diluted in a small Erlenmeyer flask to 90cc with a saturated solution of sodium chloride.

Counts were made on three, 0.3cc aliquots placed in counting chambers, similar to the one described by Gordon and Whitlock.[1] The mean number of eggs multiplied by the factor of 100 converted the number counted to the number per gram of feces. The pipette used for measuring the 0.3cc sample was made by

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removing the tip of a standard, 1cc, Mohr measuring pipette to utilize the full bore, which is necessary when working with cattle feces to prevent the large particles of plant material from clogging it. Suction for filling the pipette was provided by a small rubber bulb from a medicine dropper.

The suspension used had the following composition: Hexachloroethane, 1 pound; bentonite, 1.5 ounces; water, 1.5 pints.

Results

Examination of the 17 yearling steers revealed 11 that had sufficiently heavy infections to show eggs when the fecal samples were diluted for counting. The number of eggs ranged from 33 to 500 per gram of feces. The mean number of eggs per gram of feces for each of the 17 animals was 137. Of the six steers negative on the dilution counts, five were positive and one negative in salt flotations of 0.5-gm samples. Fourteen of the 17 steers were available for re-examination one week after medication. In the dilution counts, five showed from 33 to 66 eggs per gram of feces; eight were positive and one was negative in salt flotations. The mean number of eggs per gram of feces for each of the 14 animals at this time was 11.7. The result of these examinations are given in Table I.

In the postmortem examinations, the medicated calves showed (1) almost complete (96%) elimination of *Haemonchus contortus*, (2) marked reduction (67%) in the number of *Trichostrongylus axei*, and (3) no change in the number of *Ostertagia ostertagi*, as compared with the unmedicated animals. In the case of *O. ostertagi*, fairly large numbers were found in the duodenum of two treated calves; none were observed in that organ of the untreated animals.

The mean number of *H. contortus* per medicated calf was: abomasum 31.1, duodenum 17.7; for the non-medicated calves the mean numbers per calf were: abomasum 1,045.4, duodenum 21.8. Of *T. axei*, the average number per medicated calf was: abomasum 186.6, duodenum 1,226.6; per unmedicated calf the numbers were: abomasum 723.6, duodenum 3,581.8. In the case of O. *ostertagi*, the mean number of worms per medicated calf was: abomasum 311.1, duodenum 240; per unmedicated calf the numbers were: abomasum 258.1, duodenum 0. These data are given in Table II.

Hexachloroethane appeared to have no effect on the hookworm, *Bunostomum phlebotomum*, as the numbers were evenly distributed in both groups of calves, with an average of seven worms per animal.

TABLE I.—EFFECT OF HEXACHLOROETHANE SUSPENSION ON THE ROUNDWORM EGG COUNT IN YEARLING HEREFORD STEERS EXAMINED BEFORE AND AFTER TREATMENT WITH HEXACHLOROETHANE SUSPENSION

Calf No.	Number of eggs per gram of feces: Before treatment	After treatment
1	66	+[1]
2	133	33
3	166	+
4	100	+
5	366	—[1]
6	+	+
7	266	died
8	+	33
9	500	11 (killed)
10	+	33
11	33	+
12	—	66
13	+	+
14	133	killed
15	66	?[2]
16	+	+
17	500	+
Total	2,329	165
Mean	137	11.7

[1] The + or — mark indicates eggs were not found in the dilution counts, but were either present (+) or absent (—), as indicated, in sodium chloride flotation when larger aliquots of the sample were used.
[2] This animal was lost.

Conclusion and Summary

Ranchers in the Gulf Coast region who medicate their cattle with hexachloroethane for the control of the common liver fluke, *Fasciola hepatica*, frequently inquired regarding the anthelmintic properties of this drug against stomach worms, which are important pathogens of cattle in the area.

Following medication of about 3,000 yearling Hereford steers with hexachloroethane suspension, gross examination of the feces showed many dead *H. contortus*. Egg counts on 17 of these animals showed a drop of from 137 eggs per gram of feces before medication to 11.7 in 14 steers after medication.

When hexachloroethane suspension was given to nine calves, about eight months of age, in doses sufficiently large (3.5 ounces) to control liver flukes,[5] post-mortem examinations of them and of 11 comparable, untreated control animals showed the drug to have nematocidal properties against certain species of stomach worms. It was highly effective against *H. contortus* in the abomasum, as judged by the mean number of worms found in the treated as compared with the untreated animals, but ineffective against individuals of this species in the duodenum. Untreated calves harbored 96% more *H. contortus* than treated ones. The treatment showed marked efficacy against *T. axei* as there were 73% fewer worms in the medicated than in the unmedicated calves. Hexachloroethane in the dosage administered appeared to be wholly ineffective against *O. ostertagi*.

TABLE II.—POSTMORTEM WORM COUNTS IN 9 CALVES WITH HEXACHLOROETHANE SUSPENSION AND IN 11 COMPARABLE UNTREATED ANIMALS

	Abomasum			Duodenum			
Calf No.	Haemonchus contortus	Ostertagia ostertagi	Trichostrongylus axei	Haemonchus contortus	Ostertagia ostertagi	Trichostrongylus axei	Bunostomum phlebotomum
Medicated							
157	0	160	0	40	0	40	14
163	0	40	200	0	0	840	24
303	0	320	0	0	0	4040	11
305	0	520	120	0	0	2880	8
307	0	0	40	0	0	40	0
310	0	120	640	0	0	480	2
312	0	280	0	80	1160	0	1
315	280	1120	360	40	0	2720	3
317	0	560	0	0	1000	0	0
Total	280	2800	1680	160	2160	11,040	63
Mean	31.1	311.1	186.6	17.7	240	1226.6	7
Non-Medicated							
160	1560	280	3520	120	0	9920	22
164	240	320	440	40	0	1120	20
296	0	80	1200	0	0	8440	7
304	0	240	80	0	0	120	0
306	640	120	0	0	0	440	3
308	960	80	0	0	0	360	7
314	2820	120	920	0	0	7360	9
316	3800	480	1800	40	0	2680	4
318	200	80	0	0	0	240	2
319	1200	640	0	40	0	3480	3
1322	80	400	0	0	0	5240	0
Total	11,500	2840	7960	240	0	39,400	77
Mean	1045.4	258.1	723.6	21.8	0	3581.8	7

The ineffectiveness of hexachloroethane against hookworms, *B. phlebotomum*, in calves, parallels the results of Hall and Cram[2] against hookworms, *Ancylostoma caninum*, in dogs.

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Bovine Mastitis and Its Control

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THE incidence of bovine mastitis in its various forms in the United Kingdom is high. The economic loss in milk alone is said to be 40,000,000 gallons annually. Research work has been in progress for a number of years and will be continued until reliable and efficient methods of control have been devised. Considerable progress has already been made by the British investigators and field trials are now in operation for the testing of the control methods elaborated as the results of research work and small laboratory trials.

As in other countries, the association of micro-organisms with the different types of bovine mastitis has been worked out. It has been shown that *Streptococcus agalactiae* is probably the most important micro-organism involved, largely because of its high incidence, especially in the subacute type of the disease and because of the ease with which it is spread from cow to cow and from quarter to quarter. Surveys have been made from time to time to show the incidence of the various micro-organisms in bovine mastitis as it occurs in the field. From them there is much evidence of the prevalence of *Streptococcus agalactiae*. Most of the research work has been concerned with it. Some of the results of observations made by a group of workers were published in 1944 by the Imperial Bureau of Animal Health as Review Series No. 2, "Modes of Spread of *Streptococcus agalactiae* Infections in Dairy Herds."

Trend of Recent Research

Some of the conclusions drawn from this work have a considerable bearing on the subject. Thus, in addition to showing the prevalence of *Streptococcus agalactiae* infections in the udder, it is pointed out that these micro-organisms are commonly found on the skin of the teats and udder; that their spread is associated largely by milking operations and that in the control of bovine mastitis attention must be given to the prevention of this spread.

Recent research work, therefore, has been concerned largely with the elimination of *Streptococcus agalactiae* from infected udders and the evolving of methods to prevent the entrance of the micro-organisms into the healthy or cured udder. Most attention has been given to the first of these problems.

Therapeutic agents of various types have been the subjects of experiments and trials. For a time, the acridine dyes, especially acriflavin, were used for udder injection and good results were reported. They had the disadvantage, however, of being somewhat irritating to the udder tissue but, until drugs of the sulfonamide group and later, penicillin, became available, drugs of the acridine dyes were largely used.

Following the introduction of sulfanilamide many experiments were undertaken. It was shown that the oral administration of sulfanilamide in sufficient amounts and at satisfactorily spaced intervals is valuable in allaying systemic disturbances and in restoring to normal altered udder secretions associated with *Streptococcus agalactiae* infections; but a bacteriological cure of the udder was not usually attained. Nevertheless, the oral administration of the drug was largely practiced and was of much assistance in restoring the milk yields in infected dairy cows. Attention has again been directed to injection of the udder and the two agents now used, almost to the exclusion of others, are sulfanilamide in the form of an emulsion, and penicillin. The former is composed of lanette wax 1gm, arachis oil 20cc, sterile distilled water 79cc, homogenized by passing twice through a suitable machine, to which is added 36.6 grams of finely ground sulfanilamide; the final concentration of sulfanilamide is 30% of the mixture; 50cc is the amount injected into each quarter. Trials have shown that a daily injection given on four consecutive days was followed by a bacteriological cure in 78% of the quarters so treated. As a rule there is little evidence of any irritant effect of the injection on the udder tissue.

Field Trial

Both the sodium and the calcium salts of penicillin *(Penicillium notatum)* have been used in the treatment of bovine mastitis in which *Streptococcus agalactiae* infection was present and bacteriological cures have been effected following the injection of different amounts into the affected quarters through the teat canal. A field trial, controlled by careful and efficient laboratory examinations, carried out by a group of workers yielded the results shown in Table 1.

It will be seen that there was little difference in the results of two and of four injections of 20,000 units on two occasions at 24-hour intervals and of four injections of 10,000 units at successive milkings. The recommendation is to carry out two injections of 20,000 units at 24-hour intervals. The drug is injected as a solution in sterile water: the amount of fluid injected does not appear to influence the treatment but it is usual to use 50cc per

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quarter. From all the research work carried out with penicillin injected into the udder, it can be stated definitely that the drug is perfectly bland and causes no irritation to the udder tissue even when injected in large amounts.

In carrying out injections into the udder through the teat canal great stress is laid on observing the greatest care to insure that the equipment is sterile and to prevent the transference of infection from animal to animal or from quarter to quarter.

It has been observed that some strains of *Streptococcus agalactiae* are resistant to sulfanilamide: this accounts for some of the failures following the injection of the drug into the udder. It has also been shown that in some udders where there is a failure of response to sulfanilamide good results follow the use of penicillin.

Similar good results of the use of sulfanilamide and penicillin are not obtained in udder infections caused by staphylococci or *Corynebacterium pyogenes*. There are indications that staphylococci infections may sometimes be cured by the injection of very large amounts of penicillin but the response in infected udders varies considerably: there is no evidence that *C. pyogenes* infections show any response.

Danger of Reinfection

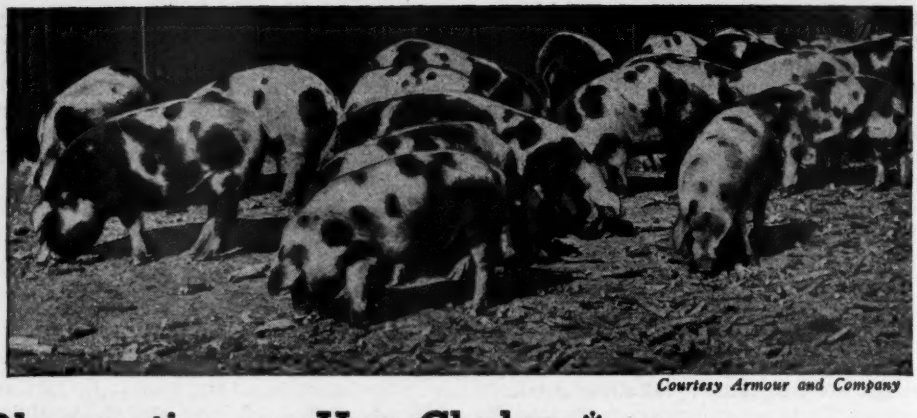
While these treatments are of much value in effecting bacteriological cures of infected udders they do not render the udder resistant to reinfections. It follows, therefore, that in controlling bovine mastitis associated with *Streptococcus agalactiae* infection, in addition to the treatment of infected animals, precautions have to be taken to reduce to the minimum the chances of reinfection. *Streptococcus agalactiae* is found in many situations: it can be recovered from milkers' hands long after milking infected cows and from equipment or articles with which infected milk or milkers' hands come into contact. While these sources of infection are important, probably the greatest danger lies in the presence of the micro-organism on the skin of the udder and teats. It has been shown that large numbers may be present in cracks and wounds of the teats. Thus, in milking operations either by hand or by machine there is considerable likelihood of the conveyance of infection from cow to cow and even from quarter to quarter. Experiments were made in the hope that it might be possible to anoint the hands of the milkers with some material which would prevent the carrying of such infections. Up to the present no suitable agent has been found: in fact the various agents used have proved harmful in that they had an irritant effect on the teats and caused the development of sores and cracks with resultant increase of infection in them and consequent further infection of the udders. The advice we give in this country is: careful and adequate sterilization by steam of all equipment, including the essential parts of milking machines, antiseptic treatment of cracks, sores and wounds on teats and udders and the washing of the udders and teats, and milkers' hands with a hypochlorite solution of adequate strength.

There is no doubt that if infected udders are treated, especially with penicillin following regular bacteriological examinations of milk samples, and care is exercised to limit the spread of infection of *Streptococcus agalactiae*, bovine mastitis in dairy herds can be greatly controlled. There is still, however, much research work to be conducted into the basic principles concerning bovine mastitis. Such work is now in progress: the control measures now being used must be regarded as palliative and the best we can recommend at present.

TABLE I.—RESULTS FOLLOWING INJECTIONS OF PENICILLIN INTO THE TEAT CANAL

No. of doses	Unitage	Interval	Infections sterilized	
			Cows	Quarters
1	100,000	—	31/62 (50%)	81/140 (57.9%)
2	20,000	24 hours	52/71 (73.2%)	123/154 (79.9%)
4	20,000	24 hours	47/65 (72.3%)	121/150 (80.7%)
4	10,000	successive milkings	53/73 (72.6%)	125/150 (83.3%)

Large numbers of organisms may be present in the wounds and cracks of the teats



Courtesy Armour and Company

Observation on Hog Cholera*

In this country hog cholera ranks first in importance among diseases of swine. Time was, in the early years of vaccination against this disease, when many of those engaged in livestock sanitary activities believed, and often stated, that it was the *only* swine disease of importance. This view of course is no longer held but to this day, when a practitioner is called to see a herd of ailing swine, the first decision he is called upon to make is whether the trouble is, or is not, hog cholera.

Treatment of hog cholera is a waste of time, but the disease is definitely preventable. However, its spread is so rapid that once it enters a herd it must be detected early to be handled successfully, i.e., to avoid the loss of many animals. It is precisely in this incipient stage that diagnosis is often exceedingly difficult. Only by injecting blood from suspected animals into susceptible pigs can an unequivocal decision be made. This is not practicable as it takes too long. A diagnosis must be made without delay based upon the history, the symptoms and findings on necropsy.

History.—The history, when it can be obtained, is significant. Has the herd been properly immunized? If not, first consider the possibility of hog cholera. If it has been immunized, in what appears to have been a proper manner, further search is imperative.

Another portion of the history, which the clinician needs to know has to do with the course of the disease. How many animals became sick at the beginning of the outbreak? How long was it before others sickened and how many sickened in the second group? How long have the sick animals lived and how did they act? In the typical outbreak of hog cholera one or two animals sicken suddenly and linger along for a week or 10 days. The owner is seldom much concerned about this. He often thinks the animal may have been injured or is a "little off" from some minor cause. About seven to ten days after the first animals sickened, a considerable number sicken at the same time, or within a period of one or two days. It is then that the veterinarian usually is called and he must act immediately, and properly, if more than a minor fraction of the herd is to be saved.

No other common disease of swine acts in just this way. With influenza, a large percentage of the herd—75 to 90% or more—sicken at the outset. With swine erysipelas the spread is slow and rather uniform. In the various enteritides the progress of the disease in the individual is slower and animals showing the ailment in all stages and degrees of severity can be found in the herd at the same time.

The owner of the herd should be interrogated concerning visitors on the farm for the past 30 days and as to hog cholera or of sick hogs from any cause in the neighborhood. The information, if affirmative, is helpful. However, a negative answer has little significance, since many attempt to conceal it from their neighbors when their hogs are sick.

A history of the premises often has value. How long have swine been raised there? From what diseases have they suffered and when? Have any new animals been added to the herd recently; if so whence came they? Have any hog-buyers been among the herd recently? Is raw garbage fed? Are kitchen slops that might contain raw pork scraps fed to the swine? Have the animals had access to drainage water from other farms, etc.?

Symptoms.—Animals sick of hog cholera lie in the nest and do not leave it when the herd is fed. Inappetence and weakness are early symptoms. When affected animals are driven

*Notes from discussions at recent veterinary meetings.

from the nest, they walk with a swaying, staggering gait; staggering chiefly in the hind legs, and they frequently knuckle over at the fetlocks. This staggering is not pathognumonic but it is highly suggestive, as is also the knuckling. Because of weakness the animal tires quickly and wants to lie down again after going a few yards. In the beginning, there is constipation and the feces are passed in the form of hard boluses covered with mucus. About the fifth or sixth day, a watery diarrhea supplants the constipation. The temperature ranges up to 106°F. or even higher. However, cases are common in which it does not exceed 104°F. The rise and fall is uniform and gradual. As in many other fatal attacks, subnormal temperature is to be expected near the end. Vomiting and lameness are two other common, but not invariable symptoms. The eyes are dull and prone to have a gummy discharge adhering to the hair, or the lids may be glued shut. Convulsions are common but not diagnostic since they occur in various other ailments of swine. Purplish areas in the skin, particularly on the belly are common, but not characteristic, since they also occur in other ailments. Evidences of pneumonia are shown in the last stages of the disease.

Sudden deaths are unusual in hog cholera. Death is the almost invariable termination in a week to 10 days except for the first cases that appear in a herd in which not infrequently the disease runs a course of several weeks and may end in recovery. The explanation has been offered, that these animals that sicken first have, commonly, acquired but a minute amount of infection, or possibly an attenuated virus. However, the fact that experimentally a fatal attack of hog cholera can be induced by as little as one one-millionth of a cubic centimeter of blood from an infected pig, casts doubt upon this explanation.

Necropsy.—Necropsies should be conducted in a professional and systematic manner; care being exercised to avoid spread of infection and to disinfect contaminated instruments, hands, shoes, equipment, and environment. Although the veterinarian may go straight from an autopsy to his office and there do a thorough job of disinfecting contaminated articles, the owner is apt to think otherwise, and unless he sees the clean-up, he may hesitate to call that veterinarian again for fear he may bring with him infection from some other farm, where he has made a post-mortem examination.

There are no pathognomonic lesions of hog cholera as it occurs in the field. It is a septicemia and, as in other septicemias, hemorrhages occur throughout the body—in the lymph glands and kidneys and on the surface of lungs and heart, and on the mucous surface of the urinary bladder, intestine and epiglottis. The petechiae of hog cholera are smaller and more regular in outline than those of other septicemias. They are found in the cortex of the kidney, instead of in the medullary portion and near the circumference of the lymph gland, instead of all through it, as in other septicemic diseases of swine.

These points of differentiation in the lesions are matters of degree only and are indicative rather than conclusive in making a diagnosis. In the more acute cases the hemorrhagic points are larger, tending to become ecchimotic instead of petechial. This is often the case in gastric and intestinal lesions, even in the less severe cases. Thus the case may be cholera even though the petechiae be not small and of regular outline. Ordinarily the spleen is not greatly altered in hog cholera, but it may show mulberry-like infarcts under the capsule. The lesions of croupous pneumonia in various stages are common. Since inappetence is one of the earliest effects of the infection, the stomach usually contains no food at necropsy. In this hog cholera differs from swine erysipelas in which the stomach practically always contains ingesta at necropsy.

Laboratory methods of diagnosis of hog cholera have never attained much popularity with the practitioner. The disease causes a leucopenia, but one is not justified in making a diagnosis in the field on the basis of a white cell count, because other factors may influence it. A white blood count is like all the other lesions, helpful in a confirmatory way but not diagnostic. Examination for inclusion bodies in the epithelical cells lining the gall bladder is one of the newer methods of diagnosis of hog cholera. Boynton finds it quite dependable, others have had little success with it. Success with this test appears to hinge upon a proper technic and experience in interpreting the microscopic picture.

Diagnosis.—The clinician must weigh all the evidence he is able to develop in the history, symptom, and lesions. He must give particular attention to the possibility that a complication of diseases may be present. If the disease, or one of the diseases, is hog cholera, only immediate action will avoid disaster. He cannot be sure in every case, but he must proceed according to his best judgment, which perhaps is a good place to recall the old saying, "It is better to be safe than sorry."

Control of Hog Cholera.—Hog cholera is preventable but incurable. It is so highly infectious, that to attain any considerable measure of success, outbreaks must be combated in their incipiency—the time when the disease is most difficult to recognize. If one could ob-

serve the course of ailment for a few days, diagnosis might become comparatively easy, but then it would be too late to save at least the major portion of the herd.

Where the diagnosis is in doubt, the owner is often the chief obstacle to handling the disease. If the herd has been vaccinated and he can blame the trouble on the serum or the vaccination, he is usually convinced the trouble is hog cholera, that lets him out. If the herd has not been vaccinated, and the responsibility is squarely upon himself, he is equally positive it is not cholera and will be inclined to adopt a policy of watch and wait. Too often this eventuates into watching the herd trucked to the rendering plant and waiting until the end of the year to enter his farm operations in red ink.

The late Dr. Marion Dorset is frequently quoted that, "in the immunization of some 300 million swine, success was due to hog cholera virus of high virulence and hog cholera antiserum in ample dosage." Since that statement was made many more million swine have been immunized and the grand total now possibly approximates one-half billion animals. We are not able to estimate the value of the serum-virus treatment to the swine-raising industry, in this and other countries, during the past 30 years. If properly administered, this treatment probably produces the most solid artificial immunity known. This should embolden our confidence in the efficacy of immunization and stimulate us to promote the confidence of swine raisers in the treatment. It should also inspire us to administer the treatment as scientifically as we can.

As has been stated, hog cholera produces a leucopenia in the affected animal. The serum-virus treatment also produces a leucopenia. This means that, for the duration of this disease, the white blood cells, the antagonists of invading organisms in the blood, are decreased in number and the natural resistance of the animal to disease, is lowered by the amount of the decrease. However, if the dose of serum is larger than that normally given, the decrease in white blood cells and the lowered resistance to disease is less than otherwise. This means that the dosage of serum should be increased largely, when the presence of any disease in the herd is known or suspected. The increasing prevalance of disease in swine, other than hog cholera, is a good argument for giving a much larger dose of serum to all hogs, than the amount stated on the label as a minimum dose. The greatest untoward reactions that have followed the use of serum and virus have been in herds that were apparently healthy when they were treated, but actually were harboring infections other than cholera, in the incubative stage.

Following the serum-virus treatment, the animals should be given good care, including proper feed and the observance of good sanitation. Operations such as inserting nose rings or castration should not be performed sooner than three weeks after immunization. However this rule is often disregarded, by experienced practitioners.

In treating cholera infected herds, the dosage of serum should be increased from 50 to 100%. Formerly, it was the custom to give serum alone in such herds and to give the simultaneous treatment three weeks later. However, a vast amount of experience has shown that it is better to give both the serum and virus at the first treatment. It is less expensive and, on the average, the percentage of survivors is greater. When serum alone was used the disease has reappeared in some herds as early as 14 days later and considerable loss occurred before it could be stopped. In other cases the serum alone treatment for one reason or another was not followed up by the double treatment, as planned, and there was a heavy loss from cholera, maybe several months later. Whether such losses are the fault of the veterinarian or not, and usually they are not, he is nearly always severely criticized for them. It seems we should be extremely careful about recommending the serum alone treatment in a cholera infected herd and equally cautious in predicting the duration of protection to be expected from such treatment.

In handling a cholera infected herd, one practical question is, which animals should be given serum virus? If any are treated the owner is quite apt to want about all of them treated and since he is paying for it, he is inclined to think the decision should be his. It is not quite so simple as that. In the first place it is the duty of the veterinarian to protect his client from needless expenditure. In the second place, the veterinarian cannot escape responsibility for the outcome. If most of the treated animals die, nine of ten farmers will forget that they selected the animals to be treated and remember only, that the veterinarian treated them and that the cost of the vaccination in addition to the value of the hogs was lost.

One way to pick out the animals to vaccinate is to throw out feed. Eliminate from consideration all that remain in the nest. Observe closely for a few minutes those that come to the feed. Some will nose around the feed and shortly return to the nest. Eliminate them also from further consideration. Those that remain and eat normally, *i.e.*, greedily, are the best risks. Many carry the screening further but taking the temperature of those that remain and eliminating those in which it is high,

considerating environmental conditions. But, no one can foretell the outcome even with those finally selected for vaccination, since it is not possible to know how many of them may be in the incubative stage of cholera. The owner should be informed that all may die, but that on the average such hogs do fairly well and the results amply justify the cost of treatment; and further these particular animals may all die and the next bunch may all live, under similar circumstances. Hog cholera is like that.

The dosage of simultaneous virus is also very important. It is the agent which produces the reaction from which we expect long-lasting immunity. The serum is given only to prevent the virus from overdoing the matter. Reaction to the virus occurs in two phases, pathogenic and antigenic. Dr. C. G. Cole determined that one-millionth of a cubic centimeter of the blood of an infected pig is sufficient to produce hog cholera in a susceptible pig. However, such an infinitesimal amount of virus is not sufficient for vaccination. The amount of virus necessary to produce immunity is not known. Probably the degree of immunity produced is related to the amount of simultaneous virus administered. In giving simultaneous hog cholera virus we should never drop below the dosage recommended by the manufacturer. It is better to give more.

Virus is a delicate product. It should be protected from heat, extreme cold and light. Portable refrigerators or thermos jugs are desirable for carrying virus to the farms. Virus should be injected at a point distant from the site of the serum injection and well into the musculature to insure absorption and to prevent leakage. No virus that is outdated or of questionable virulence for any reason should be used. Only fresh virus, that has been properly handled all the way and all the time from the pig that produces it to the hog that receives it, is safe.

The age at which swine should be immunized against hog cholera is affected by a number of conditions. The consensus is the best immunity is produced in pigs weighing 40 pounds or more at the time of immunization. If for any reason it is advisable to vaccinate them at a younger age the dose of virus should be not less than 3cc. The general opinion is that the immunization of pigs younger than six weeks of age is uncertain, notwithstanding many experienced practitioners routinely vaccinate pigs before they are two weeks of age and have done so for years with apparent satisfaction. Others have run into lots of trouble from this practice. Since the vaccination of young pigs possesses some definite advantages, it seems there must be disadvantages also or it would be more generally practiced.

In districts where there is a heavy concentration of swine, and the hog lots are badly infected, fewest complications are probably encountered if the pigs are vaccinated about two weeks before they are weaned.

The question as to whether or not to immunize pregnant sows is frequently asked. The answer is, yes, if the danger of cholera is imminent, if they are healthy, are properly handled and given an increased dose of serum. They should not be cast. Snub them and treat them standing.

Herds suffering from infectious enteritis or certain pulmonary infections or other serious ailment should be restored to health before they are immunized against hog cholera. In situations where the cholera hazard is great in such herds the practitioner is confronted with a most difficult problem. The practice in such cases is not uniform; some practitioners use serum alone—others serum and virus. The former is a questionable practice, as has been stated, and the latter is also fraught with danger. Of late years a good many practitioners have been giving such herd serum and then 10 to 12 days later giving the regular dose of virus. They report excellent results but the method has not been generally adopted.

Considering the millions of swine that are immunized every year, the loss following serum-virus treatment is small. This loss is due almost entirely to parasites and infections, other than hog cholera. When trouble occurs during the reaction to the serum-virus treatment, we should be alert to detect complicating factors. We should be ever mindful, that the animals have had a dose of virus recently and, regardless of what the complicating factor may be, they will reveal the lesions generally regarded as those of cholera. This makes the recognition of lesions of other septicemic diseases extremely difficult, if not impossible. A diagnosis can be arrived at only by a study of the herd history and careful evaluation of the symptoms, together with all the necropsy findings. It is also pertinent to know if serum of the same serial has been used on other herds with entire success. This emphasizes the necessity for keeping complete vaccination records. Other things one wants to know in such cases are: Did the pigs have access to dust or mud wallows after immunization? Did they have an opportunity to drink from cesspools scattered about in the lot? Has the farm a history of losses from enteric or pulmonary diseases? Was the ration balanced or unbalanced and did it contain irritants or poisons?

When post-immunization trouble develops it is common for the owner to take one or two

sick pigs, or pigs that have died recently, to a veterinarian other than the one who immunized the herd, or to a state or other laboratory for a diagnosis. He may say nothing about the pigs having been vaccinated or even state that they have not. If the examination is confined to the pigs before him, together with such inadequate and possibly inaccurate information, as the herd owner gives one, the only possible diagnosis is, hog cholera. One is not justified in making a diagnosis under such conditions. To do so is to make an incorrect more often than a correct diagnosis, to do great injury to a fellow veterinarian who is probably not to blame, to shake the swine raiser's confidence in the serum-virus treatment, which makes possible our swine industry, and to put him to the expense of having his herd revaccinated, which not only will not solve his trouble, but may add to his loss by delaying a correct solution. A second administration of the serum-virus treatment is very rarely indicated.

Crystal violet and Boynton's tissue vaccines possess the advantages of not bringing virulent virus on the premises and of not intensifying concurrent infections from which the animals may be suffering. They possess the disadvantage of requiring three weeks to produce a substantial degree of immunity and thus are not suitable for use in the presence of hog cholera infection or when the infection is probably imminent. Further the immunity produced by the vaccines is believed to be of shorter duration than that produced by the serum-virus treatment.

Prevention of the Spread of Hog Cholera.—Precautionary measures to prevent the spread of the disease are most necessary. Experiments by McBryde and co-workers indicate that biting flies are capable of transmitting hog cholera. Flies may follow a team of horses, or be conveyed in an automobile, for long distances. At seasons when farmers are exchanging labor hog cholera often spreads rapidly and flies may be an important factor. Horses should be treated with fly spray and automobiles should be cleared of flies before leaving an infected farm. There are other factors concerned in the spread of hog cholera since the disease spreads, at times, in zero weather, hence measures, other than the control of flies, must be taken. Teams, wagons and automobiles should be driven through straw soaked with a strong disinfectant. Dogs should be tied, especially at night, when they are prone to roam and perhaps drag home a portion of the carcass of a hog, dead of cholera. Men's shoes should be disinfected and farmers should be instructed to keep everybody out of the hog lot unless proper precautions are taken. Trucks from rendering plants should not be driven into the hog lot.

When there is an outbreak of hog cholera, the carcasses of the animals that die, should be disposed of by burning or burying deeply and covering with quick-lime. When the disease subsides, all straw, manure and débris about the hog lot should be burned and the premises thoroughly cleaned and disinfected so as not to harbor the disease and start up new outbreaks in the future.

Swine Section, Purina Research Farm

Immunity

A definition of immunity is side-stepped by most writers, but for our purposes it may be defined as an exalted resistance to infection. It does not necessarily mean complete resistance to invasion by pathogenic organisms, but a resistance materially greater than the average of the species. There are various types of immunity depending upon the classification. Age immunity is an example. It is well known that we have a whole group of ailments of the young, such as disease of young pigs and childhood diseases that are rare in adult life but do sometimes occur. By another classification we speak of species (or natural) immunity and induced or artificial immunity.

Our interest centers in induced or artificial immunity. That is what we like to produce in our well animals to keep them well, and in our sick animals that they may recover. We know little about the mechanization of immunity. We need to know as much as possible about the fundamentals of it to explain our successes and our failures in inducing it and that we may predict in advance, with a good measure of success, the outcome of our efforts.

When pathogenic organisms succeed in invading the tissues of an animal the outcome will be the resultant of two opposing forces. Either the resistance of the animal will overcome and eliminate the invaders or the organisms will overcome the defensive forces of the animal, set up housekeeping and, after a period of amassing in numbers, we have the onset of disease. Of course, during this incubation period the animal has been mobilizing and improving its defenses. The struggle continues and if the defensive forces finally get the upper hand the animal recovers and we say it is immune; if the invaders continue in the ascendency the animal eventually dies.

Artificial or induced immunity may be either active or passive. In the production of active immunity the animal must take part. Passive immunity requires no effort on the part of the body's defensive forces. It is essentially a package of defensive ammunition produced by another and given intact to the animal that is treated. When an animal recovers from an infectious disease it usually possesses an active immunity to the organisms responsible for that disease, and in some instances to related organisms. Active immunity is usually substantial and long lasting. Passive immunity, the immunity produced by a dose of antiserum or as it was formally called antitoxin, is fleeting, seldom lasting longer than three weeks to a month.

Notes from discussions at recent veterinary meetings.

In large measure active immunity comprises "know how" on the part of an animal's defensive mechanism. The know how to produce antibodies against certain specific pathogenic invaders. It takes time to set up an assembly line and get into mass production of antibodies. The minimum time in which it can be accomplished is six days and seven to 10 days is a more common requirement. In this respect passive immunity is much superior to active immunity. There are some diseases, like influenza or the "common cold," in which the incubation period is less than a week, maybe only two or three days. For such diseases, active immunity is ineffective, since mass production of antibodies cannot get under way in time. Passive immunity which is effective within 24 hours is superior. In some other diseases, that normally have an incubation period of 10 to 14 days or even much longer, the incubation period can be greatly shortened by infection with massive doses (anthrax) or by infection by unnatural routes (intracerebral in rabies and equine encephalomyelitis). Immunity can, in a measure, be by-passed by such means.

The curative effect of bacteriostatic substances (sulfonamides and antibiotic agents in bacterial diseases and para-aminobenzoic acid in Rickettsiae invasions) depend upon this immunity mechanism for their curative effects. They simply delay the development of the invading infections till the host can mobilize its antibody defenses, which eliminate the invader when they have acquired the necessary degree of adequacy for the task.

It must be kept in mind that active immunity requires action on the part of the defensive forces of the animal immunized. It requires a capacity on the part of the animal to produce the necessary antibodies. This practically presupposes a state of health. If the defensive mechanism is involved in combatting an intercurrent infection it can hardly be expected to take on a different one and handle it successfully.

What happens when swine are vaccinated for the prevention of hog cholera is illustrative of the development of immunity. The animal is given an enormous injection of virus, perhaps a million MLD's and, at the same time, a dose of hog cholera antiserum adequate to bring about complete passive immunity in 24 hours. This passive immunity continues at a high level for about 14 days when it begins to subside and is practically gone in 30 days. In the meantime the virus has attacked the cells of the body and stimulated the production of antibodies. As passive

immunity is lost active immunity is built up and the animal survives.

However, a number of contingencies can occur to interrupt this streamlined procedure. The dose of either serum or virus or of both may be inadequate, of which more later. The serum may be impotent from improper storage and handling, a rare occurrence; the virus may be weakened or dead from improper treatment. This happens more frequently since the virus is a delicate product easily damaged by improper handling. Of more interest, however, is what happens within the body of the vaccinated animal. The pig to be vaccinated should be thrifty and in vigorous health. It should not carry any bacterial or virus infection either acute or chronic. Such infections are often present when we can't recognize them clinically. Two things are prone to happen when pigs carrying intercurrent infection are given serum and virus. (1) They are apt to suffer an acute exacerbation of their infection and (2) the immunity which they develop is likely to be weak and short-lived.

An accident that may occur in vaccinating swine is neutralization of the virus by the antiserum. This happens when they are mixed before injection and probably occasionally when they are injected separately. Routinely the injections are made in different regions of the body and the likelihood of neutralization is remote, however, there is good evidence that it may sometimes occur and defeat the development of immunity.

Pigs getting the colostrum from immune sows acquire a passive immunity of varying degree, depending, at least in part, upon the strength of the active immunity of the sow. As the degree of the sow's immunity depends upon various factors which usually are unknown the immunization of young pigs should routinely be undertaken under the assumption that they are already somewhat resistant to hog cholera virus, and this calls for an increased dose of the virus. In vaccinating pigs up to one week of age, a minimum of at least 3.5cc of virus is recommended. For pigs one to four weeks of age a minimum of 3cc of virus should be used. Since pigs lose the passive immunity acquired from colostrum in the same manner that they lose the immunity acquired from the injection of antiserum, they may be vaccinated at the age of four weeks and older as non-immune swine.

A different problem in immunizing young animals is presented by calves. Calves when born possess an exalted resistance to Brucella organisms which they lose by the time they are sexually mature. During this period vaccination with Strain 19 is relatively ineffective. From birth to the age of four months in dairy calves and six months in beef calves, research indicates that such vaccination is wholly ineffective. During the second four months in the lives of the calves, Strain 19 vaccination confers an increasing immunity with the increased age of the calf at the time of vaccination. Vaccination at or near the time of sexual maturity or afterward confers a strong, long lasting resistance to Brucella infection. However, following the general rule of artificial immunity it can, in many instances, be broken down by massive infection or by artificial inoculation by unnatural routes of infection.

It is probable that all species of animals have some means of defense against their virus, bacterial and fungous enemies, just as they have against predators of greater size, strength, agility or cunning than themselves. Species not posssesing such defenses would not be likely to survive. That we have no effective vaccines against many diseases is probably due to lack of knowledge of how to stimulate the defensive forces against them, rather than to the inability of the immunity mechanism to function.

In the case of some of these diseases against which we are unable to develop an artificial immunity, premunity may be induced for the protection of the animal. B.C.G. vaccination against bovine tuberculosis is the best known example of premunization. B.C.G. vaccination consists in infecting the animal with a nonvirulent strain of *M. tuberculosis* which protects it from infection with a virulent strain of the same organism.

In human medicine the custom of immunizing persons against two or more diseases simultaneously is growing. In swine there is some evidence that such practice simply divides the defensive forces and the animal develops only one-half as much immunity against each of two diseases as it would develop against either one of them alone.

Kernkamp injected pigs with Strain 19 Brucella vaccine at 6, 10, 14 and 30 weeks of age. All developed high titers—1:3200 and above. Then he injected pigs 10 weeks of age with 5cc of Strain 19 in one flank and 5cc of crystal violet hog cholera vaccine in the other flank. The pigs developed an average titer to Brucella antigen of 1:800. It does not follow that the immunity to hog cholera which these pigs developed was lower than ordinarily results from vaccination with crystal violet alone, but such may have been the case. The milder reaction to Strain 19 causes us to suspect a similar reaction to the crystal violet vaccine.

Veterinary Problems of the Fur Ranch

By T. T. CHADDOCK, M.S., D.V.M.

Tail Suckers Occurring in Mink

The sucking of the tip of the tail is a vice which is occasionally quite prevalent on most mink ranches. The animal usually starts sucking the tail shortly after it is weaned which may be at 10 to 12 weeks of age, or it may take up this vice at any age up to maturity or until it is pelted in November.

The animal usually sucks the tip of the tail while sleeping in the nest box. The tip of the tail becomes entirely denuded of hair due to the constant sucking. A similar act has been observed in bear cubs that have been removed from their mothers. They suck each others ears and scotal sac or their own paws and emit a purring sound of contentment. No sound is produced by the mink.

In my opinion this is an incurable vice. I have dipped the tail in oil of mustard, tincture of aloes and other distasteful materials without beneficial results. The condition has been observed in entire litters of kits, indicating a tendency to the vice may be inherited.

The fur rancher is docked on his fur price when any part of his pelt is damaged. Pelts having a damaged tail cannot be used for mink scarfs or stoles or for trims of various garments. Some judges at the mink shows disqualify animals for tail sucking, regardless of the excellence of the fur.

All told the tail sucking mink is undesirable either for pelting or breeding, but we are at a loss to solve the problem with our present day knowledge.

A Practical Tattoo System for Marking Minks

So far as is generally known, no effective marking system has ever been devised in this country for permanent identification of minks.

While on a recent trip to Denmark, it came to the writer's attention that a system has been developed there within the last few years which may possibly find useful application on American mink ranches.

"The system which is used is, like in the fox, that of electric tattooing of the foot pads.

"On the front feet a dot is made in the foot pads corresponding to the number of the mink (Fig. 1). The mink shown in the drawing has a dot in the pads corresponding to the numbers 3-5-40-300 and 1000 which add up to No. 1348. Black India ink is used for the tattooing, and before each application to the pad the point of the needle is dipped in the ink. The penetration of the needle is about 1mm to 2mm into the pad.

"The hind feet of the mink are used to indicate the year of birth as shown in Fig. 2. The lateral toe on the right hind foot corresponds to No. 1 on the front foot and the toes may

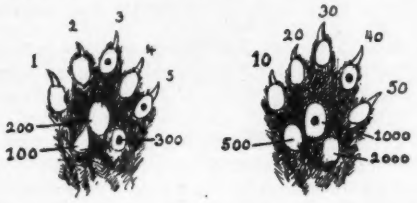


FIGURE 1. THIS MINK IS MARKED NO. 1348

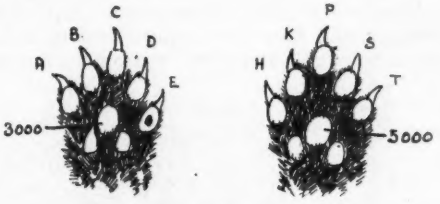


FIGURE 2. THIS MINK WAS BORN IN 1944

Courtesy American Fur Breeder

be indicated by letters in the following sequence:

1940	A	1945	H
1941	B	1946	K
1942	C	1947	P
1943	D	1948	S
1944	E	1949	T
		1950	A

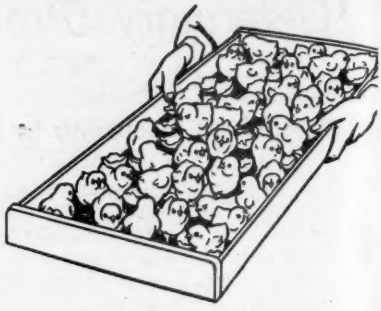
"A mink born in 1944, thus, is marked with a dot on the innermost toe of the right hind foot corresponding to number 5 on the right front foot.

"If numbers higher than 4000 are desired, the foot pads of the hind feet may be used as indicated in Fig. 2.

"During the tattooing operations the younger animals may be handled with leather gloves and the older animals in traps. The leg is then simply pulled out through the wire."

It is possible that this method may also be found useful by biologists or wildlife technicians who wish to identify muskrats or other animals with flesh-colored foot pads that are not easily ear tagged.—E. R. QUORTRUP in *Am. Nat'l. Fur & Market J.*

Hatchabilty of Shell-Disinfected Eggs

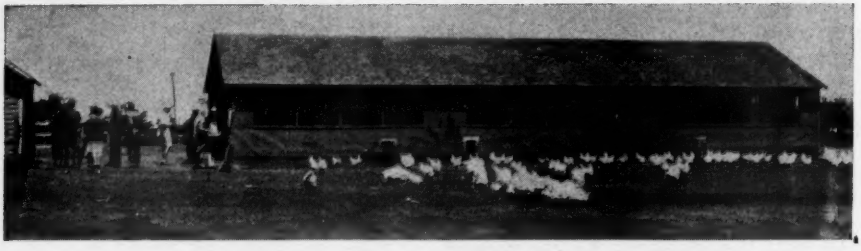


By M. W. OLSEN* and E. H. McNALLY*
Beltsville, Maryland

A recent report by Tilley and Anderson[1] showed that certain chemicals were effective in destroying the virus of Newcastle disease as contained in the amnio-allantoic fluid of embryonated hens' eggs. Among the more effective chemical agents were sodium hydroxide, sodium orthophenylphenate and certain quaternary ammonium compounds. Incubation tests were undertaken at the Agricultural Research Center at Beltsville, Md., in order to determine whether these compounds in the concentration and time required for destruction of Newcastle virus, would affect the hatchability of treated eggs. The tests were carried out as follows:

Twenty-five quarts of the solutions indicated in Table I were used for each lot of eggs. Each lot of eggs was placed in a container, the container filled with one of the disinfecting solutions, allowed to stand five minutes and the solution drained off. The eggs were placed in the incubator without wiping following disinfection.

The results of the incubation tests are presented in Table I. It is obvious that under the stated conditions of treatment 2% aqueous solution of sodium hydroxide, 1% aqueous solution of sodium orthophenylphenate and 0.1% solution of the quaternary ammonium compound employed had no effect on the hatchability of the eggs, which were shell-treated with these disinfectants. The solutions used should be freshly prepared. Two per cent sodium hydroxide is somewhat corrosive and should be kept in vessels of wood, earthenware, enamelware, or any of the common metals except aluminum. The containers should have a draw-off valve at the bottom.



Laying flock on clean, well drained, dry runs

[1] Tilley, F. W. and W. A. Anderson. Germicidal action of certain chemicals on the virus of Newcastle disease. *Vet. Med.*, 42:6, p. 229. 1947.

*Bureau of Animal Industry Agricultural Research Administration, United States Department of Agriculture.

TABLE I.—HATCHABILITY OF HENS' EGGS DIPPED IN CERTAIN DISINFECTANT SOLUTIONS BEFORE INCUBATION

Preincubation treatment			Incubation data			
	Concentration		Eggs set (number)		Chicks hatched	
Disinfectant	Percent in distilled water	Time (minutes)	Total	Fertile	Number	Percent of fertile eggs
Sodium hydroxide	2	5	413	381	315	82.7
Sodium orthophenylphenate	1	5	423	359	295	82.1
Quaternary ammonium	0.1	5	412	380	322	84.7
None	Control		412	376	324	83.9

Veterinary Practice—X

Side Lines in Veterinary Practice

By E. T. BAKER
Moscow, Idaho

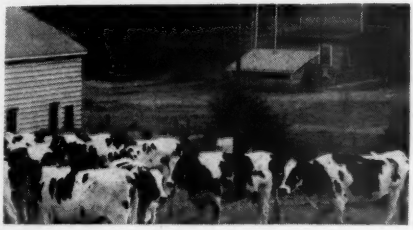
TO our way of thinking, practice is a one-man job, and if one attempts side lines he is liable to make a failure of them and his practice as well. If one does not like practice, and prefers something else, why not quit practicing.

However, some lines of work are allied to general practice closely, and go along with it without conflict. We will attempt to enumerate a few of these:

State Animal Disease Control

Many states now appoint local practitioners as deputy or assistant state veterinarians, with a *per diem* salary and mileage allowance while employed on state work.

While the pay is, in the main, inadequate, state work possesses a number of advantages that out-weigh the inadequate fees. (1) It increases the prestige of the practitioner among his clients, and enables him to make new acquaintances. (2) It enables the practitioner who is establishing a practice in a new community to get acquainted more quickly and to avoid drawing so deeply on his reserves for



State work increases the prestige of the practioner among his clients

living expenses while he is becoming established. (3) It affords the recent graduate who is without funds and has little credit, a source of income and an opportunity for acquaintance that may mean the difference between getting started and failing. (4) In hard times, when most fees of even the well established practitioner are going "on the cuff" this source of cash income can be most welcome.

Many localities that will not support a practitioner, need veterinary service to build up a livestock industry. This is where state work can do a great deal of good to the community, often can virtually make it over from an impoverished to a prosperous locality. The change from "one crop" to diversified farming requires livestock and livestock raising, to be prosperous, requires veterinary service.

Furthermore it is a duty of the practitioner to render his state a service in case of need. Membership in a profession involves obligations to one's fellows that has been recognized throughout the period of recorded history. In addition, a license to practice one's profession confers certain privileges on the licensee, that the courts stand ready to uphold. It follows that certain obligations, that cannot be shirked with impunity, go along with these privileges.

Federal Work

In many counties, local practitioners are the logical ones to test cattle for tuberculosis and brucellosis. Dairymen want their herds tested near a given date, and at an hour when it is most convenient to them. The local man can usually do this, whereas a federal veterinarian might have to travel several hundred miles under such circumstances to test one herd of a few cows.

From the practitioner's point of view the worst feature about government work is reports it is necessary to make out. Just what finally happens to these original, duplicate, triplicate and quadruplicate reports, and who reads them and what finally becomes of them, is as much of a mystery to me, as boarding house hash.

A horny-handed citizen of the great United States who happens to pass some infected animals for interstate shipment and who survives the resultant course of federal correspondence is never the same man again. It is much like the tussle we had with our local ration board in an endeavor to get an extra mud tire during the tire shortage. We walked around talking to ourself for several days, and our bowling average dropped from 182 to 176.

City Work

In the generation just passing, many city practitioners had a lucrative side line taking care of the fire or police horses. In the larger cities, this was very profitable, although sometimes slightly infiltrated with alley politics, which were not undefiled.

Then came city milk and meat inspection, which offers a steady though, except in the large cities, small income. Our town, for example, pays us $50 a month as city meat inspector. It does not take much time, and we can do much good in keeping spoiled meat off the market. However, small town butchers are pretty careful about this, for in such com-

munities everybody knows everybody's business.

Editorial Work

Many farm journals engage veterinarians to conduct "veterinary columns" in which queries on diseases of livestock are answered. A small salary is paid for this. In the past 25 years, as a veterinary columnist we have answered over 35,000 questions, and in about 34,900 we have emphasized the importance of consulting the local, or nearest, veterinarian. Perhaps, if we had not been in active practice, we might have omitted the latter suggestion. It doesn't take many years in practice to teach one the uncertainty in making a diagnosis from the owner's description of the animal, even over the telephone in response to questions.

Authorship

Very few practitioners indulge in writing, although their wide experience peculiarly fits them to write interesting literature, and thus make a valuable contribution to veterinary knowledge. Compared with medical literature the paucity of recorded veterinary clinical observation is astonishing. More clinical observation published by practitioners, would be of great advantage to veterinary research.

To interest a large publishing house, a book must have a wide appeal. For example, the best book ever written, but solely devoted to the chinchilla, would have a very narrow market. A volume devoted to all farm animals, however, would have a large potential market.

We mention this phase of the business, as explained to us by the Macmillan Company, for the benefit of would-be authors whose manuscripts come back after repeated trips to publishers.

Mainstreet Boosters

Elsewhere we have explained the opinions our rugged clients of the mountains and valleys would hold, if, when they called us to treat an acute case of spasmodic colic in Old Nellie, or the best cow down with milk fever, they were told we were somewhere on the golf course.

Of course the practitioner will want to take part in the social, political, cultural, civic and sports activities of his community. However, as in everything else he should participate in moderation. And limit himse'f to worthwhile matters. Membership in our Elks Lodge and participating in its bowling tournaments has been a source of recreation and a great deal of pleasure to us over the years. The initiation of many enduring friendships are due to these associations. On the other hand membership in the A.S.F.P.P.P.O.L.C. (American Society for Preventing Putting Panties on Lamb Chops) has contributed little to our physical, mental or moral welfare.

Politics

Some practitioners imagine themselves to be natural born statesmen. They run for councilmen, mayor, county commissioner, state representative or what have you? Others desire to be state veterinarians, or to have any sort of position that does not require the use of rubber gloves. There can be two opinions about one's civic duties and social responsibilities. We have it figured that in our case we can serve our community best in the field for which we are specially trained, and that is *not* the political arena.

The Hon. George Gillie is one of the few in our profession who has made a conspicuous success in the political field. He has been a credit to our profession and to his state.

A practitioner with a well equipped laboratory will find much call for his services

Laboratory Work

This can fit in very nicely with practice, particularly along poultry and dairy lines.

Specialties

Specialization has long been a prominent phase of the medical practice. Many veterinarians are also taking to specialized practice.

There is a wonderful field for this. Our profession has too many ramifications for any one man to comprehend them all.

For example, I would be lost in attempting to treat a sick thoroughbred or wild animals in a zoo.

Contract Work

From the standpoint of a man up a tree it looks as if state medicine and state veterinary medicine are just around the corner—or maybe it is the coroner. Having never had any experience with contract work, we cannot say much about it.

Groups, such as those formed for artificial insemination, are the forerunners of this type of practice. If we could come back to earth from Heaven a hundred years hence, we might be surprised. We might even be surprised to be in Heaven.

College Work

This is a job in itself, and to try to teach and conduct a practice is an utter futility. We had two years of this, and we know. Some of our veterinary colleges give their professors sabbatical leave, *i.e.*, let them out one year in seven for good behavior. They usually spend the time visiting other colleges, research institutes and laboratories. Just the old story of the mail carrier who takes a nice long walk on his afternoon off.

However, some plan whereby professors and practitioners could exchange places now and then would help both and, most of all, the students. One can become lopsided by sticking too close to any one line of endeavor.

Commercial Lines

Trying to operate a garage, service station or store along with a general practice is seldom, if ever, a good plan, unless one has unusually good employees. In fact, nothing which interferes with a normal home life and an unhurried approach to practice, is worth the cost. We go through this world only once, so why not try to have a fairly good time?

Handling an agency for some good, reliable supply house can be profitable, but one needs good assistants who watch accounts closely.

Farming

We know of several practitioners who operate farms successfully. They are fortunate in having reliable help and devote but a small amount of time each day to supervisory work, while being available for emergency calls. However, to try to farm and do the work and in addition conduct a general veterinary practice seems to be quite a chore. We should not expect either the farming or the practice to be conspicuously successful.

Retirement

As we grow older we see, among our friends, the benefits and tragedies of retirement.

We can envision a nation where every person retires at 65 years of age with sufficient pension to live comfortably. This person, if possessing any particular skill, could be utilized in an advisory capacity. In our profession, for example, these retired persons could go out a week or two on calls with younger men; giving the latter the benefit of their experience and skill. They could give a couple weeks' course to the seniors in our colleges. This would not interfere with the regular college teaching, but merely act as a supplement or extra vitamin.

These are only a few of the side lines open to practitioners.

(To be continued)

Experiments in France with three fungi (*Arthrobotys oligospora, Dactylella bembicodes* and *Dactylaria ellipsospora*), predators of nematode larvae on pasture herbage, lead to the conclusion that these fungi are harmless to pasture grasses and to animals grazed upon herbage infected with them. They can be safely used in the control of nematode infestation in animals by reducing the number of infective larvae on the pastures.

Congress on Brucellosis

The first Inter-American Brucellosis Congress in Mexico City from Oct. 28 to Nov. 2, 1946, was attended by delegates from most of the American countries. Over 60 papers were presented, covering various subjects:

Epidemiology

A considerable diffusion of brucellosis throughout the continent has occurred during the last few years. Evans, Jordan, Schmidt and Campbell showed that the increment of human cases was due not only to better means of diagnosis but to a real increase in the occurrence of the infection. [I. Forrest] Huddleson pointed out that after the attempt to suppress bovine brucellosis in the United States through radical measures, the infection is again as extensive as before and consequently the chances of transmission to man as high as ever. Furthermore, to the bovine strains which produced the majority of human cases in the past must be added cases due to the suis and melitensis types of infection. Pasteurization of milk obviously has not been sufficient to stop brucellosis; therefore other sources of infection must be taken into account. Direct contact with infected animals is a source of infection. Man to man infection has to be taken into consideration. [Alice] Evans advanced the opinion that the great adaptability of Brucella may bring about at any moment "canine strains" and even "human strains." If this occurs the epidemiology of the disease may become greatly complicated. .....

Control of Brucellosis

Epidemiologists from the most seriously affected zones of Mexico supplied information concerning plans for the organization of a campaign for the control of brucellosis appropriate to each region, since general regulations have failed.

Most delegates agreed that a wide educational campaign, particularly among persons living in contact with goats and hogs, is highly necessary. It became apparent that we are far from a good plan for the control of brucellosis in animals.—*J. Am. Med. Assn.*, 133:11, pp. 798-799. 1947.

Clinical Reports

Intussusception in a Springer Spaniel

Intussusception is not uncommon in young puppies, however we have recognized but one such case in an older dog. The patient was a large, male springer spaniel 18 months of age. He had been under treatment elsewhere for a period of two weeks for bloody diarrhea and almost complete anorexia. The temperature at the time of admittance was 103° F., the animal appeared very dejected and had that "foreign body look." A fecal analysis proved negative. However, on palpation, some abnormality was felt in the intestinal tract and the dog was hospitalized for radiological study. A barium meal was given *via* stomach tube and retained. There was no history of vomiting. One hour later several exposures were made and a tentative diagnosis of either intussusception or "silk stocking impaction" was ventured.

Surgery was delayed for 24 hours and the subject prepared by use of 5% dextrose in saline infusions and parenteral vitamins. A perfect anesthesia was obtained through the use of morphine-atropine, followed in one hour by pentobarbital sodium, intravenously, to effect. The laparotomy revealed an intussception of approximately five inches of the ileum through the ileocolic orifice into the colon. Strong adhesions prevented the manual correction of the condition and a resection was performed. It was necessary to remove nearly a foot of combined large and small intestine, as well as the cecum. An end to end anastomosis was impossible due to the difference in lumen size of the ileum and colon, and a side to side was ruled out because of the then confusing mesenteric attachments. Instead, an end to side was completed by closing the colonic aperture and then incising and preparing a new opening in the side for the anastomosis with the end of the ileum. Cotton sutures were used entirely for the intestinal work.

During the course of the operation 400cc of gelatine-saline solution* was infused into the radial vein *via* the drip method. The respiration and pulse remained constant throughout the surgery and the dog evidenced no symptoms of shock following. We attribute the success of the operation largely to the use of this fluid in preventing surgical shock, which was to have been expected in this extremely debilitated patient. Aftercare consisted of penicillin for 48 hours, additional subcutaneous saline-dextrose and vitamins, and four days of sulfathalidine for intestinal antisepsis. Liquid food was allowed the first day and solid food after a week. Recovery without complications, was complete in 10 days. A year has passed and the patient is in excellent health.

W. G. MAGRANE

Mishawaka, Ind.

*Supplied for investigational use by The Upjohn Co., Kalamazoo Mich.

* * * *

Bilateral Fractures of the Humeri in a Puppy

The patient, a pointer five months of age, was brought to us immediately after having fallen off a porch (height approximately four feet). The puppy's attitude was one of intense pain. It lay on its side with arched back and generalized muscular tremors, and of course was crying.

Upon palpation of the forelegs distinct crepitation was felt at both the left and right humero-radial articulations. Under the fluoroscope the fractures could be seen without difficulty. Both left and right humeri had complete fractures at the distal ends just proximal to the lateral condyles.

The dog was given ½ grain of morphine sulfate and 1/100 grain of atropine sulfate by subcutaneous injection. In approximately one hour sodium pentobarbital was given intravenously until complete muscular relaxation was reached. Casts were then applied by using a layer of absorbent cotton, a layer of gauze, a wooden splint on the lateral surface, another layer of gauze and last a layer of adhesive tape.

Our next problem was, not only one of healing a fracture, but of preventing hypostatic congestion of the lungs, since the animal had absolutely no use of its forelegs.

We devised a sling from a piece of canvas by cutting four holes for the legs and one for the penis. At each corner of the canvas we placed a piece of sashcord. Then we suspended the pup under a carpenter's saw-horse. We kept him in a standing position during the day and allowed him to lie down at night.

Our daily treatment consisted only of one teaspoonful of dicalcium phosphate powder and three of cod liver oil, supplemented with a diet of fresh meat, milk and a prepared dog meal.

After 14 days the casts were removed. There was very good callous formation in both legs and some severe pressure sloughs on the toes of the right foot, which we treated successfully with a sulfathiazole ointment. Within three days after the removal of the casts the pup was making fair attempts at walking and the case was discharged.

Three weeks later the owner reported that the pup was doing fine and had regained almost its normal gait.

PAUL FRIEDMAN

Danville, Va.

Sub-Clinical Leptospirosis in a Setter

A male Llewellin setter, 10 months of age, was presented for treatment with a history of having been slowly losing weight and aptitude. Its spirit of alertness had changed to one of depression and lassitude. The appetite had become very poor and his refusal to eat, except for scanty amounts of food, had alarmed the owner, who valued it highly. The dog had shown exceptionally good hunting characteristics a month previously.

Two weeks earlier another veterinarian had examined the patient, diagnosing the condition as internal parasites. A vermifuge was given. The owner had no knowledge of the type of parasites present or the kind of vermifuge used. However, no improvement resulted from the treatment and the symptoms, mentioned in the foregoing, became progressively more marked.

Upon examination, the following symptoms were noted: Petechial hemorrhages on the oral mucous membranes—few in number and easily overlooked. The oral mucosa showed some evidence of anemia and dehydration. The conjunctiva was slightly congested. The skin seemed dry and the hair coat was loose and lacking the usual luster. Palpation of the kidneys caused severe pain. Fecal examination was negative for internal parasites. The consistency of the feces suggested slight constipation. The temperature, pulse and respiration were normal. The patient exhibited definite evidence of toxemia and a provisional diagnosis of sub-clinical leptospirosis was made. A guarded prognosis was given. The owner was advised to hospitalize the dog and return in a week.

The following treatment was used: At 3:00 p.m. on the first and third days, 10cc leptospirosis antiserum, 15cc Pitman-Moore Biologic 656, 1cc liver extract and 25,000 units of penicillin were given intravenously in 200cc of 5% dextrose solution. Further treatment consisted of 20,000 units of penicillin intramuscularly and 15 grains of sulfathiazole *per os* given at 8:00 a.m., 12 noon, and 3:00, 6:00 and 10:00 p.m. for three days. Fifteen grains of methenamine were given *per os* with the 8:00 a.m. and 10:00 p.m. treatments. After the third day, the dosage of penicillin was reduced to 10,000 units and that of sulfathiazole to one gram, given at the same time of day as before. The use of methenamine was continued but was reduced to 10 grains. The supportive treatment consisted of vitamins A and B_1, bile salts, triple arsenates and iron administered at irregular intervals throughout the course of treatment. A diet high in animal protein was fed during the period of hospitalization.

The patient began to show improvement after three days on the foregoing treatment. Bloody urine was noticed on the third day, but did not reappear. The animal was allowed outdoor exercise daily. No enema was necessary as bowel movements remained nearly normal.

The hair coat, mucous membranes and attitude of the patient were sufficiently improved by the seventh day of treatment to advise the owner to call for the dog. The dog still evidenced slight pain upon palpation of the kidneys. The appetite seemed normal and the dog was released on the eighth day. The owner was advised to feed a ration of equal amounts of cooked horse meat and commercial dog food during the convalescent period.

J. STERLING HARVEY

Belle Plain, Kan.

Fatal Hemorrhage in a Sow Due to a Ruptured Liver*

Internal hemorrhage and death resulting from the torsion of the left lateral lobe of a sow's liver presented an unusual necropsy at Oregon State College last spring.

The subject was a purebred Duroc-Jersey sow 13 months of age and weighing about 380 pounds. She was nursing six pigs of an original litter of eight. The pigs were four weeks of age, and the condition of the sow and pigs was good. The sow and pigs were on a small pasture that was flat and free from ditches, holes, and depressions.

Death was sudden; the sow was found dead by the caretaker while doing the morning feeding. She had eaten the feed given her the preceding evening.

During the necropsy the following observations were made:

The mucous membranes of the eyes and mouth were very pale. The large vessels of the axillary and cervical regions were nearly free of blood. A large amount of blood flowed from the abdominal cavity when opened. An organized clot was found in the omentum adjacent to the liver. The left lateral lobe of the liver was rotated 180°. A rupture about 1½ inches in length was seen on the parietal surface of this lobe. The left lateral lobe was enlarged and very congested. The remainder of the organ was anemic. The condition appeared to be acute.

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The accompanying photograph shows clearly the congestion of the left lateral lobe, as well as the constriction of the tissues on the axis of the rotation. The rupture was on the

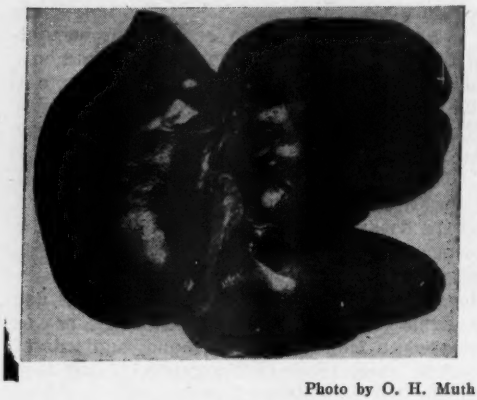

Photo by O. H. Muth

parietal surface and does not show in the photograph.

Three months later a second case identical to the preceding occurred on the same farm in a two-and-one-half-year-old Berkshire sow that raised and weaned a normal litter last spring. An occurrence such as this is unusual, but that two such cases should occur on the same farm in a 90-day period passes understanding.

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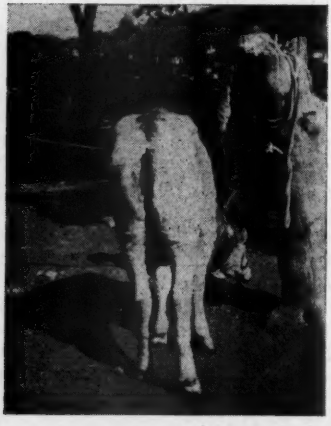
A Tail-less Calf



This eight-month-old Brahma heifer was born devoid of all coccygeal vertebrae—J. Howard Hathaway, Elgin, Ariz.

Intestinal Strangulation in a Newborn Puppy

November 20, 1946, a four-year-old, black and tan dachshund bitch, weighing 17 pounds, was brought to the clinic at 2:00 p.m. for treatment. A diagnosis of approaching parturition was made. No labor pains were apparent, although the allantois chorion had ruptured about 8:00 a.m.

A vaginal examination revealed there was no dilation of the cervix and 1½cc of posterior pituitary extract was injected subcutaneously. In 30 minutes another vaginal examination revealed there still was no dilation of the cervix. Again 1cc of posterior pituitary was injected. After another 30 minutes, a vaginal examination revealed still no dilation. Preparations were made for a cesarean section. One-half grain of morphine and 1/100 grain of atropine were given subcutaneously as a basal anesthetic. The abdominal area between the mammae was shaved and painted with metaphen. An alcoholic sublimate pack was applied. In about 15 minutes, the operative area was locally anesthetized with a 2% solution of procaine hydrochloride.

A mid-line incision, posterior to the umbilicus, was made through the skin, muscular aponeurosis, and peritoneum. After uterine adhesions to the abdominal wall and abdominal viscera, caused by a cesarean operation nine months previously, had been broken down, the left horn of the uterus was pulled through the incision to the exterior. Gauze packs were placed between the uterus and the incision. An incision was made in the left horn and one fetus removed. Sulfathiaziole powder was sprinkled in the cavity of the horn, which was then closed with Lembert sutures. After tacking the omentum over the incision, the horn was replaced. Observation of the right horn revealed cysts, adhesions, and abscesses from the previous cesarean operation. The peritoneum was sutured with a continuous suture as was the aponeurosis of the muscles; 00 catgut being used. Mattress sutures of linen were used for the skin. An endovenous injection of 50cc of 5% dextrose and saline solution was given. Before placing the bitch in a heated cage, 0.5cc of amphetasol was given. At 9:00 p.m. the dextrose and saline solution was repeated. Around 4:00 a.m. the bitch died.

Examination of the puppy showed a large intestinal prolapse through the umbilical ring to have occurred. Embryologically the umbilical ring had not closed leaving an opening about 1cm in diameter. The skin had grown up to this ring, but had failed to close over the opening. Evagination of the peritoneum

through this opening had carried all the small intestine and the omentum. The hernial sac covered by the peritoneum was approximately the size of a large walnut. Surgical treatment was given immediately. A small incision was made through the skin and the hernial ring was dissected. The small intestine and peritoneal sac were replaced in the abdominal cavity. After suturing the abdominal muscles with single interrupted catgut sutures, the skin was closed with one linen mattress suture. Sulfathiazole powder was placed on the incision and a bandage applied.

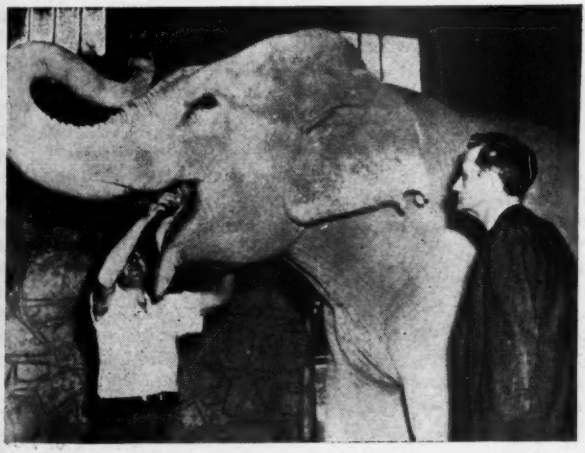
The pup was strong and viable for two days when it began to show symptoms of dyspnea and continuous pain by constant crying. It opened its mouth to breathe. On the third day, euthanasia, by prolonged ether anesthesia, ended its suffering. An autopsy revealed that the small intestine was strangulated due to the persistent umbilical ring which had not been dissected away. Gangrene had not set in, but severe inflammation and local passive hyperemia was present. The stomach was dilated with gas to approximately five times normal size. This explained the labored breathing.

This operation, we believe, would have been a success had the hernial ring been cut, freeing the small intestine. The cause of pain and approaching death was due to toxemia of the strangulated small intestine.

JACK BALLENTINE

Bonner Springs, Kan.

Medication of a Pachyderm



By concealing 400 grams of sulfathalidine in apples and feeding them to her, Ed Hefele, curator, and Dr. Reese Mitcham (right), veterinarian, recently treated Ruth, the ailing elephant at Fair Park Zoo, Little Rock, Arkansas. Following the dosage, attendants watched Ruth's progress closely and later reported she was feeling fine.

Pyelonephritis—An Apparent Recovery

Pyelonephritis, an ascending infection of the urinary tract caused by *Corynebacterium renalis,* is becoming of increasing importance in the United States. It was first reported in this country by W. L. Boyd in 1918. Since then the number of reported cases has increased annually. D. H. Udall states that it is not possible that the disease had escaped previous recognition in the clinic at the New York State Veterinary College because it has such distinctive lesions. He further states:

"The infection is a highly fatal, chronic, purulent inflammation of the bladder, ureters, and renal pelvis. It occurs chiefly in cows but has been recognized in swine, sheep, horses, and dogs."

The causative organism, *Corynebacterium renalis,* is a gram-positive diphtheroid, 2 to 3 microns in length which may be found in clumps on microscopic examination of stained smears of the urine or exudate. So far as has been determined its only habitat is the urinary tract.

The main symptoms are a general ill health accompanied by loss of condition over a period of weeks or even months. There is usually a decrease in milk production. The animal appears restless and quite often stands with the back arched. Urination is frequent. The urine may contain blood, pus, or a mixture of the two. Rectal examination discloses enlargement of the kidneys and ureters. Frequently the kidneys are so increased in size that the normal lobulation is not apparent and the surface may feel smooth on palpation.

On autopsy the bladder appears thickened, hemorrhagic, and edematous. The distended ureters show hemorrhages of the mucosa. The external surface of the kidneys may present grayish opaque areas and the capsule is usually adherent. On incision, the renal pelvis may be found to contain quantities of mucilaginous grayish or yellowish pus. This is often mixed with blood and urine.

It has been stated that if recoveries ever occur that they are very infrequent. W. L. Williams has stated that the condition is incurable. The case here described is one of apparent recovery from this "incurable" disease, as a result of treatment with a combination of sulfonamide and penicillin—a good illustration of the superiority of these new therapeutic agents over

those available only a few years ago.

During my senior year at Kansas State College, while on a routine ambulatory call to the College dairy herd, April 30, 1946, the attention of the clinician was called to a four-year-old Ayrshire which had shown vague symptoms involving a loss of condition and a drop in milk flow during the past several months. This animal had been in lactation since Jan. 16, 1946. Parturition had been normal but the placenta had been retained. It was removed after 72 hours and 20mg of stilbestrol was given. On complaint from the herdsman that the cow was "doing poorly," additional stilbestrol was administered—35mg April 25th and 20mg April 29th.

The animal was standing with the back arched. Extreme pain was evidenced on palpation of the sublumbar region. Rectal examination disclosed that both kidneys were swollen to the size of a man's head. The ureters were also enlarged. There was a marked hematuria. This combination of symptoms led to a tentative diagnosis of pyelonephritis which was later confirmed in the clinical pathology laboratory. The urine was found to contain albumin, and microscopic examination of a stained smear under the oil-immersion objective revealed clumps of the diphtheroids.

It was decided that therapeutic measures should be instituted immediately. It might be pointed out at this time that D. H. Udall states there is no established effective remedy for the condition. The bacteriostatic action of the sulfonamides against gram-positive organisms has long since been established. Sodium sulfapyridine had, however, been previously tried on other cases, but without avail. It was decided to try a combination of the bacteriostatic action of the sulfonamides and the antibiotic action of penicillin. It is a recognized fact that penicillin is highly effective in combatting many infections caused by gram-positive organisms.

The animal was first segregated from others in the herd and kept in a box stall at all times, except during actual milking. Treatment was then begun.

A solution of 30 grams of sodium sulfapyridine in 500cc of distilled water was prepared and administered intravenously. This was accompanied by an intramuscular injection of 200,000 units of penicillin. Other doses of penicillin were given so that the total quantity injected before midnight of the first day was 500,000 units.

During the next day, 600,000 units of penicillin were administered, together with 20 grams of sodium sulfapyridine and orally three one-ounce doses of sulfanilamide was given. On the third day, the quantity of penicillin was reduced to 400,000 units and the sodium sulfapyridine was discontinued. One ounce of sulfanilamide was given *per os*, three times daily. The sulfanilamide was continued in the same dosage for 10 days until urine samples, secured at regular intervals, gave negative results for albumin. The albumin was determined in a semiquantitative manner using Heller's cold nitric acid test. May 8, there was but a trace of albumin in the urine. The following day the sample was negative. In the meantime, the animal had begun to regain a normal appearance and her milk flow was showing a gradual increase. Recovery was thought to have occurred.

May 18th, however, the herdsman and the writer noticed that the animal was exhibiting a definite pyuria. Treatment was again instituted by giving 100,000 units of penicillin, four times daily and one ounce of sulfanilamide three times daily. May 23rd, the amount of penicillin was reduced to 200,000 units daily, and continued at that rate until May 29th, when the urine was again negative for albumin. Microscopic examination of sediment from a centrifuged urine sample failed to reveal the presence of either diphtheroids or pus cells.

Now, nine months after treatment was discontinued, the animal seems to have entirely recovered from the infection. Her general condition is very good. She has had no recurrence of symptoms and she is producing a normal amount of milk. In a recent herd classification she received a good-plus rating.

It may be well to point out that the genital ill health suffered by the animal—the retained afterbirth—was probably related to the infection. Systemically, the disease often presents a chronic vaginitis or metritis, which may have been the case in this animal and have been the cause of the retained placenta.

This seems to be a distinct triumph for the new chemotherapy. Recognized authorities agree that infectious pyelonephritis in cows is insurable by the older methods of treatment. This recovery must be attributed to the sulfa drugs and penicillin. The clinical diagnosis, as stated, was confirmed by microscopic and cultural examination.

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Kansas City, Mo.

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Abstracts

Effect of Restricted Rations on Aging and Disease

In our modern age of nutrition the theory has been dominant that the body should be supplied with an excess of essential nutrients from the cradle to the grave.[31] Little attention has been given to possible advantages of low levels of nutrition during at least certain periods of the life cycle of men and animals. Most research has considered only a brief fraction of the total span of life of men or animals. Exept in special areas, short-time studies give little evidence of possible interrelationships between the level of ingestion of nutrients and the performance of a man or animal during the whole of life.

Inasmuch as most meat producing animals are slaughtered before they have completed more than one-third of their total span of life, little attention is paid to any factor other than a feeding program that will maintain health and an efficient conversion of feedstuffs until the time of slaughter. Human beings, however, are supposed to be reared for the purpose of optimum productivity during a whole span of life, and the same to a degree applies to work animals and the dairy cow. The potential productive life of a dairy cow is about 20 years, yet in our more intensive dairying sections it is actually about five years.

The author reviews the findings of Chadwick who investigated English prisons a century ago and found the mortality approximately twice as high among prisoners receiving 218 ounces of solid food per week as among those receiving 128 ounces per week. Also, research in which it was found tumors in mice could be largely prevented by maintaining them upon a near starvation diet is cited. His own experience with low nutritional levels in dogs and rats is given. All have given similar results.

For example: "Rats, long retarded by diets with excess of recognized essential nutrients, but inadequate in energy allowance to permit growth, far exceed the normal span of life for their species. The oldest rat thus far lived 1456 days, while the normal span of life for a white rat is about two years. . . . From our earliest studies it was evident that the retardation of growth upon diets of excellent quality, but restricted in amount, resulted in a long span of life because the retarded rat was less subject to the usual terminal diseases that start in the second year."

[31] McCay, C. M. Effect of restricted feeding upon aging and chronic diseases in rats and dogs. *Am. J. Pub. Hlth.*, 37:5, pp. 521-528. 1947.

Pentothal-Curare Anesthesia

Baird reports[41] the use of a combination of pentothal sodium and *d* tubo-curarine chloride in over 150 anesthesias. Less pentothal sodium was required than when no curare was used and the recovery period was shortened. The preparation used was a 2.5% solution of pentothal sodium to which was added 0.7mg of purified *d* tubo-curarine per cubic centimeter. Unpurified curare would not work in this combination since it is incompatible with pentothal.

Effect of Evaporation on Body Temperature

Minnett[40] conducted an experiment in Central India to determine the effect of surface wetting (rain, artificial rain and wallowing) on the body temperature of water buffaloes, zebu cattle, small hill cattle and sheep. Tests were made in the hot, dry season and during the monsoon; with animals at rest and after exercise. In general, wetting the surface lowered the temperature from 1° to 3.5° F. Wetting in the forenoon lowered the temperature on the average approximately twice as much as a similar wetting in the afternoon.

"New Castle Virus" Infection in Man

Avian pneumoencephalitis, which is responsible for a high mortality rate in fowls and is common in the Middle East, is due to a filter-passing virus. A case is described[42] of this infection occurring in a laboratory worker; a 23-year-old, girl-assistant at the government laboratory for the study of poultry disease who touched her left upper eyelid while injecting poultry for vaccination. The following day the eye became red and painful and the pain increased for four days. A broad subconjunctival hemorrhage appeared but there was no discharge and there was no change in the cornea and no change in the deeper parts of the eye. The conjunctival changes were most marked on the fifth day but remained confined to the one eye and thereafter underwent gradual but progressive improvement. Since the virus can be recovered from all the tissues of an infected fowl it is not surprising that the infection in the human subject is most comon in women employed in the preparation of poultry for the market.

[40] Minett, F. C. Effects of artificial showers, natural rain and wallowing on the body temperatures of animals. *J. Animal Sci.*, 6:1. 1947.

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Canine Distemper "Cure"

Whatever impression may have been created by reports to the effect that concentrated cultures of *Aspergillus fumigatus* give important results in the treatment of canine distemper were dispelled by controlled experiments conducted on ferrets by Goret and Méry[39] who report: "*Aspergillus fumigatus* appears to have no effect on the evolution of canine distemper." Well-meant reports as to its curative value appear to have been based upon results obtained from the treatment of upper respiratory troubles mistaken for the prodrome of the virus infection.

Arctic Dog Disease

For a score of years the Division of Animal Pathology of the Canadian government has received reports[44] of disease outbreaks among sled dogs and foxes in the Arctic Northwest. In 1932 a staff member visited various posts but found no affected animals nor material for study. At intervals since communications describing new outbreaks and specimens of tissue from affected animals have been received. The information was meager and of little assistance in determining the condition. The specimens were preserved in alcohol and seldom reached the laboratory within a year, hence were useless for biological examination.

Four years ago plans were made to send a staff member to the next outbreak at an accessible post. Last year such an outbreak occurred at Baker Lake, 400 miles north of Ft. Churchill. It could be reached by airplane. The investigator found no sick animals but the solidly frozen carcasses of three dogs and a fox that had, presumably, died of the disease, were available and specimens and information were collected.

In the Arctic the disease is called "crazy fox disease." It occurs in cycles when foxes or lemmings are especially plentiful. At such times many of these animals and occasionally wolves are found dead. The disease is usually communicated to dogs by "crazy foxes" entering the camps and biting the dogs. They will also attack persons but cannot bite through the heavy skin clothing.

The symptoms include inappetence, accelerated breathing and panting, spasms and a frightened expression. Later the animals become vicious and many of them bite their tails. Death usually occurs on the fourth day from the onset of the disease. The incubation period is believed to be short. The disease is less prevalent among sled dogs now that the custom is to keep them tied than it formerly was when they were permitted the freedom of the village.

Examination of the specimens collected revealed that the fox and one of the dogs had had rabies. The cause of death in the other two dogs was not determined at the time the report was made; examination of the specimens not being complete.

In the author's view arctic dog disease is, in part at least, rabies and may be in part a fox encephalitis or a combination of conditions other than rabies. He concludes that rabies has existed in this region for a long period and wild animals constitute the reservoir of infection. A further conclusion is that eradication is not possible.

Mastitis Due to Streptococcus Faecalis

This report[43] of an outbreak of acute mastitis derives interest from the unusual causative organism and from a rather uncommon pattern of onset and recovery.

The herd comprised 42 Holstein-Friesian cows, mostly first-calf heifers. It had been assembled within three months and was at pasture.

Within a period of five days eleven cows (10 of them first-calf heifers), all at the peak of production were stricken with acute mastitis with hard swollen quarters and temperatures ranging from 105 to 107° F.

Quarter samples examined from the 31 unaffected animals revealed a Streptococcus which could not be typed immediately. The same organism found in the affected quarters of the other animals was found in five quarters of three animals and Streptococcus agalactiae in three animals. All quarters were clinically normal. Each of the 31 cows was given a protective dose of acute mastitis serum and the six showing streptococci in the milk were given two injections of penicillin, 50,000 units per quarter. None of these animals developed any clinical signs of mastitis.

The 11 clinical cases were given acute mastitis serum, sulfanilamide internally, and two infusions of penicillin. All recovered in three to seven days. The first two cases to occur suffered relapses on the 11th day, one showing the same untyped Streptococcus and the other a hemolytic Staphylococcus. Both cleared up from the same treatment but the quarter from which the Staphylococcus was isolated atrophied considerably.

Typing the causal organism showed it to be *Streptococcus faecalis*.

[39] Goret, P., and Méry, F. Essai du traitment de la maladie de Carré par les extraits d' *Aspergillus fumigatus*. Bul. de l' Académie Vét. de France, 22:2, pp. 74-77. 1947.

[44] Plummer, P. J. G. Preliminary note on arctic dog disease and its relationship to rabies. Canadian *J. Comp. Med. and Vet. Sci.*, 11:6, pp. 154-160. 1947.

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